EARTHJUSTICE

ALASKA CALIFORNIA FLORIDA MID-PACIFIC NORTHEAST NORTHERN ROCKIES
NORTHWEST ROCKY MOUNTAIN WASHINGTON, D.C. INTERNATIONAL

July 12, 2013

Via Presentation at Public Hearing and Electronic Mail

Metropolitan Transportation Commission
Plan Bay Area Public Comment
101 Eighth Street
Oakland, CA 94607
eircomments@mtc.ca.gov

Re: Supplemental Comments on Environmental Impact Report to Plan Bay Area

Dear Metropolitan Transportation Commission:

B50-1

The Bay Area contains various key transportation hubs, including one of the largest ports in the United States and several major airports, through which large volumes of goods and people transit on a daily basis. These transportation hubs are located in largely minority and low-income areas, which are burdened by adverse health impacts from emissions from the ships, trucks, planes and railways cutting through their neighborhoods. Yet the Association of Bay Area Governments ("ABAG") and Metropolitan Transportation Commission ("MTC") have failed to analyze and plan for the impacts of goods movement through the area.

B50-2

This letter supplements the comment letter submitted by Earthjustice on behalf of Communities for a Better Environment on May 16, 2013, on the Draft Environmental Impact Report ("Draft EIR") for the Plan Bay Area ("Plan").[1] The purpose of this letter is to highlight the violations of the California Environmental Quality Act ("CEQA") inherent in the treatment of "goods movement" issues in the Plan, as well as the Environmental Impact Report ("EIR").

B50-3

The Plan and the EIR violate CEQA in the following ways: (a) "goods movement" issues were included at the last-minute as a component of the Plan, in a manner which showed that the project description of the EIR is inadequate, and deprived the public of a meaningful opportunity to comment on the EIR; (b) the EIR conducts a cursory and piecemeal analysis of "goods movement" issues; and (c) given our continued reliance on trucks and freight to deliver consumer goods, accounting for "goods movement" issues should be an integral part of the environmental analysis of the regional transit plan, and yet, such accounting is not included in the cumulative impacts discussion of the Draft EIR or the Final EIR.

MTC and ABAG are obligated to consider "goods movement" issues when designing the Bay Area transit plan, and the agencies' last minute inclusion of a goods movement piece violates their obligations under state and federal law.

1. Impacts of "Goods Movement" in the Bay Area

Goods movement is a substantial component of the Bay Area economy and is expected to grow significantly in the near future. MTC's 2009 Regional Goods Movement Study "found that manufacturing, freight transportation and wholesale trade account for nearly 40% of regional output and

[1] This letter was presented during the public comment portion of the July 12, 2013 Policy Board Meeting.

that Bay Area businesses spend over $6.6 billion on transportation services, and goods movement businesses create over 10 percent of regional employment…." (*See,* Plan Bay Area: Final Adoption (MTC Resolution No. 4111, ABAG Resolution No. 06-13), Attachment A: List of Changes for Plan Bay Area at 23 (July 5, 2013).) The overall movement of goods nationwide and in the region is expected to increase. The Federal Highway Administration projects a nationwide increase of 80% in freight tonnage hauled by trucks, a 73% increase in rail tonnage, and air cargo tonnage is expected to quadruple.[2]

B50-4 Activity in California ports is expected to increase by 250% between the present and 2020.[3] Furthermore, due to shifting land use patterns, trucks transiting through the Bay Area are expected to increase the distances travelled to deliver their cargoes.[4]

The movement of goods and freight has serious environmental and public health implications. A significant portion of the greenhouse gas emissions from transportation is due to the movement of freight and goods through California.[5] Currently, one quarter of the Bay Area's particulate matter (PM) 2.5 emissions are generated in Alameda County, which hosts Interstate 880 and 80, routes heavily trafficked by the trucks transporting goods from the Port of Oakland.[6] In fact, I-880/80 carries the highest volume of truck traffic in the region, and I-580 has the second highest volume of truck traffic in the country.[7] Many of these routes cut through largely minority and low-income communities.[8] These emissions cause a number of adverse health effects, from increased respiratory and cardiovascular ailments, to premature death.[9]

2. The EIR Violates CEQA's Requirement to Provide A Legally Adequate Project Description

B50-5 EIR has failed to provide an accurate and complete project description as demonstrated by the last minute inclusion of a goods movement strategy in the Plan and failure to describe this strategy in the project

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[2] National Environmental Justice Advisory Council, Reducing Air Emissions Associated with Goods Movement: Working Towards Environmental Justice at 3 (November 2009), *available at* http://www.epa.gov/compliance/ej/resources/publications/nejac/2009-goods-movement.pdf.; attached in Appendix to Comment Letter.

[3] California Air Resources Board, Climate Change Scoping Plan at 52 (December 2008)("Scoping Plan"), *available at* http://www.arb.ca.gov/cc/scopingplan/document/adopted_scoping_plan.pdf.

[4] Association of Bay Area Governments, ABAG Executive Board, Item 7C Addenda: Additional Key Issues and Policy Recommendations at 3 (June 20, 2013).

[5] California Air Resources Board, Climate Change Scoping Plan at 52 (December 2008)("Scoping Plan"), *available at* http://www.arb.ca.gov/cc/scopingplan/document/adopted_scoping_plan.pdf.; attached in Appendix to Comment Letter.

[6] *East Oakland Diesel Truck Survey Report* 3, (Communities for a Better Environment, September 2010).

[7] Alameda County Transportation Commission, Briefing Book: Countywide Transportation Plan, Ch. 9: Goods Movement at 9-3 (March 3, 2011); *available at* http://www.alamedactc.org/files/managed/Document/3144/ALAMEDA_CTC_09_Goods_Movement.pdf.; Attached in Appendix to Comment Letter

[8] *East Oakland Diesel Truck Survey Report* at 3; Pacific Institute, Paying with Our Health, the Real Cost of Freight Transport in California (November 2006) at 16; *available at* http://www.pacinst.org/reports/freight_transport/PayingWithOurHealth_Web.pdf; attached in Appendix to Comment Letter

[9] *East Oakland Diesel Truck Survey Report* at 3; Bay Area Air Quality Management District, West Oakland Truck Survey (December 2009) at ES-4; *available at* http://woeip.org/wp-content/uploads/2010/12/West-Oakland-Truck-Survey-Final-Report-Dec-2009.ashx_.pdf; California Air Resources Board: Final Emission Reduction Plan for Ports and Goods Movement, Appendix A: Quantification of the Health Impacts and Economic Valuation of Air Pollution from Ports and Goods Movement in California (March 21, 2006); *available at* http://www.arb.ca.gov/planning/gmerp/plan/appendix_a.pdf

description of the EIR. Consequently, the public has not been provided with sufficient opportunity to be informed and comment on the Plan's goods movement strategy and its environmental consequences.

An "accurate, stable and finite project description is the sine qua non of an informative and legally sufficient EIR." *Cnty. of Inyo v. City of Los Angeles*, 139 Cal. Rptr. 396, 401 (Cal. Ct. App. 1977). A legally adequate project description facilitates CEQA's transparency and notice objectives, which allow full, informed public participation in the environmental review process. *See,* Cal. Pub. Res. Code § 21003(b). However, if an EIR fails to "adequately apprise all interested parties of the true scope of the project for intelligent weighing of the environmental consequences of the project, informed decisionmaking cannot occur under CEQA and the final EIR is inadequate as a matter of law." *Communities for a Better Env't v. City of Richmond*, 108 Cal. Rptr. 3d 478, 486 (Cal. Ct. App. 2010) (internal citations omitted); *see also, Sunnyvale W. Neighborhood Assn. v. City of Sunnyvale City Council*, 119 Cal. Rptr. 3d 481, 513 (Cal. Ct. App. 2010).

CEQA requires a "project description" to contain specific elements and information, including a "statement of objectives" and the "project's technical, economic and environmental characteristics considering the principal engineering proposals if any and supporting public service facilities." Cal. Code Regs. tit.14, § 15124. While the description need not provide "extensive detail," *Id.*, the "project description must contain sufficient specific information about the project to allow the public and reviewing agencies to evaluate and review its environmental impacts." *Dry Creek Citizens Coal. v. Cnty. of Tulare*, 82 Cal. Rptr. 2d 398, 402 (1999).

B50-6 Despite the significant land use and public health concerns generated by the transportation of goods through the area, neither the Plan nor the EIR contain any significant analysis of "goods movement" issues.

B50-7 Various organizations commented about the planning agencies' obligation to consider "goods movement" issues as part of the Plan, as well as the public health and other concerns associated with truck traffic and other modes of goods transportation.[10] In its letter, the California Department of Transportation

B50-8 ("CalTrans") specifically reminded MTC of its obligation to consider goods movement issues under "Moving Ahead for Progress in the 21st Century" ("MAP-21").[11] CalTrans further recommended that the Plan include a goods movement chapter, which would contain "discussion of intercity rail, interregional roads, and air and seaports that provide connections to and through major metropolitan regions," and would "discuss strategies to enhance the regional transportation system for increasing freight mobility and fostering economic growth."[12] However, it was only during the public hearings on the Plan Bay Area and Draft EIR that MTC and ABAG began discussing goods movement issues.

During the Joint ABAG and MTC meeting on June 14, 2013, the issue of "Goods Movement and Industrial Lands" was raised as an "Additional Initiative" and/or "Priority for Plan Bay Area

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[10] *See* Letter from Roadstar Trucking, Inc. to One Bay Area (May 15, 2013); Letter from Azibuike Akaba, Policy Analyst, Regional Asthma Management and Prevention Program ("RAMP") on behalf of Ditching Dirty Diesel to Metropolitan Transportation Commission and Association of Bay Area Governments (May 16, 2013); Letter from Fred Blackwell, Assistant City Administrator City of Oakland to Steve Heminger (May 16, 2013); Letter from Zelda Bronstein to Amy Worth (May 15, 2013).

[11] Letter from California Department of Transportation to Metropolitan Transportation Commission (May 16, 2013) (recommending that the Plan include a chapter on goods movement, discuss in detail interregional travel and freight mobility, or at a minimum discuss intercity rail, interregional roads, and air and seaports that provide connections through the region).

[12] *Id.*

Implementation."[13] According to the agencies, such implementation measures should be "added to the final Plan Bay Area as key areas for additional work by ABAG and MTC. That work will permit these issues to be considered more fully in the 2017 update of the Plan Bay Area."[14] Specifically, with respect to goods movement and industrial lands issues, the agencies stated: "[t]he movement of freight and the protection of production and distribution facilities has important environmental, economic and equity implications for the region. Building on MTC's *Regional Goods Movement Study* and related land use analysis, MTC/ABAG will evaluate the needs related to development, storage and movement of goods through our region and identify essential industrial areas to support the region's economic vitality."[15]
B50-9 However, this intent to study goods movement in the future ignores that goods movement was not considered in the Final EIR, the document that analyzes the environmental impacts of the plan and related projects.

B50-10 During the June 20, 2013 ABAG Executive Committee Meeting, the committee voted to include goods movement and industrial lands issues as an implementation that would be part of the Plan Bay Area. The addition to the Plan acknowledged that goods movement in the area "has important environmental, economic and equity implications for the region."[16] The Plan now provides for the agencies to continue studying goods movement issues, including a commitment for MTC and ABAG to "work with the local business community and local jurisdictions and stakeholders to explore economic development best practices for goods movement and industrial businesses and identify funding to assess the role of goods movement businesses and industrial land in the regional economy."[17] It also states that MTC is working with Caltrans and local congestion management agencies to update studies on goods movement issues and identify future recommendations, which will "inform the Region's input to the California Freight Mobility plan, and implementation of the newest Federal transportation bill, MPA-21, which addresses the performance of the national freight network and supports investment in freight-related surface transportation projects."[18]

B50-11 Despite pressing public health concerns, and the agencies' acknowledge of the importance of considering goods movement issues, the phrase "goods movement" appears in the EIR project description only two times, both times devoid of any indication of its role in the Plan and without mention of the strategies that would be implemented to deal with goods movement issues. First, "goods movement" appears in a list of issues which are required to be considered under the RTP Guidelines adopted by the California Transportation Commission. (Draft Environmental Impact Report Plan Bay Area, Overview of the Proposed Plan Bay Area 1.2-12.) Second, the EIR states that the proposed Transit Investment Strategy "acknowledges the importance of goods movement corridors and identifies investments and strategies to ensure that these essential resources continue to support the region's economic diversity and vitality." (*Id.* at 1.2-37.) However, the sole goods movement related project is implementing Alameda County's Goods Movement Program, which "includes improvements for goods movement by truck and

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[13] MTC and ABAG Staff Response to Key Issues and Preliminary Recommendations - Draft PBA Potential Revisions at 17 (June 14, 2013), *available at* http://apps.mtc.ca.gov/meeting_packet_documents/agenda_2070/6.14.13_Draft_PBA_potential_revisions_MTC_ABAG_Final.pdf.

[14] MTC and ABAG Staff Response to Key Issues and Preliminary Recommendations – Key Issues and Preliminary Recommendations at 3 (June 14, 2013) , *available at* http://apps.mtc.ca.gov/meeting_packet_documents/agenda_2070/Item_3b_Key_Issues_and_Prelim._Recommendations.pdf.

[15] *Id.*

[16] Plan Bay Area: Final Adoption (MTC Resolution No. 4111, ABAG Resolution No. 06-13) at 23 http://apps.mtc.ca.gov/meeting_packet_documents/agenda_2089/3c_Final_PBA.pdf.

[17] *Id.*

[18] *Id.*

coordinated with rails and air." (*Id.* Appendix C: Transportation Projects in Each EIR Alternative.) These vague, cursory mentions of goods movement utterly fail to indicate the scope of the Plan's goods movement and industrial lands implementation measure, and render the EIR legally deficient.

B50-12 The public cannot consider the environmental consequences of the Plan when MTC and ABAG omit information from the EIR project description. Here, the EIR fails to serve its informational purpose of apprising the public of the true scope of the Plan. Omission of discussion of goods movement and industrial lands from the project description of the EIR, and a last minute addition of a goods movement piece to the Plan itself, subverts the purposes of CEQA, by failing to provide an accurate and stable project description. Such exclusion of information impedes informed public participation and "[b]ecause of this omission, some important ramifications of the proposed project remained hidden from view at the time the project was being discussed and approved. This frustrates one of the core goals of CEQA." *Santiago Cnty. Water Dist. v. Cnty. of Orange*, 173 Cal. Rptr. 602, 608 (Cal. Ct. App. 1981).

3. The EIR Violates CEQA By Conducting a "Piecemeal" Analysis

B50-13 The EIR attempts to improperly defer consideration of the goods movement implementation measure's impacts by omitting its consideration until a future date, constituting piecemeal review which is prohibited under CEQA.

Agencies cannot allow "environmental considerations [to] become submerged by chopping a large project into many little ones—each with a minimal potential impact on the environment—which cumulatively may have disastrous consequences." *Bozung v. Local Agency Formation Com.*, 529 P.2d 1017, 1031 (Cal. 1975). Because such dissection of projects frustrates CEQA's objectives of meaningful analysis and disclosure of information, "CEQA forbids 'piecemeal' review of the significant environmental impacts of a project." *Berkeley Keep Jets Over the Bay Comm. v. Bd. of Port Comm'rs*, 111 Cal. Rptr. 2d
B50-14 598, 608 (Cal. Ct. App. 2001). MTC's and ABAG's acknowledgement that more study of goods movement need to be done because it "has important environmental, economic and equity implications for the region" demonstrates that the project has been piecemealed. This EIR has improperly separated the goods movement implementation measure from the Plan and omitted it from its analysis, in violation of CEQA.

B50-15 Here, the goods movement implementation measure will change the scope *and* nature of the Plan *and* its environmental effects. The scope and nature of the Plan may change due to the actions taken with regard to goods movement and industrial land retention. After all, the Plan is a regional transit plan and the implementation measure addresses freight and goods movement on the roads, rails and in the ports in the region. As discussed previously, size of the freight and goods movement industry in the Bay Area demonstrates the far-reaching implications of activities in this sector. Moreover, the Plan's environmental impacts could be different and/or more severe depending on the strategies employed under the implementation measure because the Plan and the implementation measure will impact the same areas: air quality, greenhouse gases, land use, noise, and traffic. Therefore, analysis of the effects of goods movement issues must be conducted in conjunction with analysis of other aspects of the Plan.

4. Metropolitan Planning Agencies Must Consider "Goods Movement" Issues When Designing a Regional Transportation Plan

B50-16 The failure to include goods movement as part of the project in the EIR is particularly egregious, because metropolitan planning agencies are required to consider goods movement issues when developing regional transportation plans. These agencies are mandated by federal law to consider the "accessibility

and mobility of people and for freight" when developing regional transportation plans.[19] The transportation plan must include "[o]perational and management strategies to improve the performance of existing transportation facilities to relieve vehicular congestion and maximize the safety and mobility of people and goods."[20]

B50-17 MTC and ABAG have failed to follow this mandate, since the Plan contains only a cursory consideration of goods movement issues (which was added by a last-minute amendment, only weeks before the Plan was due to be finalized). Despite acknowledging that "[t]he movement of freight, and the protection of production and distribution businesses, has important environmental, economic and equity implications for the region," the Plan fails to provide any meaningful "operational and management" strategy for dealing with goods movement concerns. (Plan Bay Area: Final Adoption (MTC Resolution No. 4111, ABAG Resolution No. 06-13), Attachment A: List of Changes for Plan Bay Area, 23 (July 5, 2013).[21] Instead, the Plan makes a tepid commitment for the agencies to conduct further study of goods movement issues. *See,* Plan Bay Area: Final Adoption (MTC Resolution No. 4111, ABAG Resolution No. 06-13), Attachment A: List of Changes for Plan Bay Area, 23 (July 5, 2013).)[22]

B50-18 Other planning agencies within the state of California have followed this mandate. For example, the South Coast Association of Governments' ("SCAG") Regional Transportation Plan includes a section dedicated to the "Goods Movement System."[23] The SCAG RTP emphasizes the importance of planning for "[a] world-class, coordinated Southern California goods movement system that accommodates growth in the throughput of freight to the region and nation in ways that support the region's economy vitality, attainment of clean air standards, and the quality of life for our communities."[24] The plan provides a strategy for dealing with expected growth in goods movement needs, such as creating a system of truck-only lanes connecting area ports with key transportation corridors, a truck congestion management plan, and plans for developing a zero emissions truck fleet.[25]

5. The EIR Violates CEQA's Requirement to Adequately Assess the Cumulative Impacts of a Project

B50-19 If MTC and ABAG maintain that the goods movement is not part of the project, then the EIR fails to engage in a cumulative impact analysis that considers how goods movement concerns might interact with all aspects of the Plan.

CEQA requires that an EIR consider "cumulative impacts," which requires consideration of individual effects "which, when considered together, are considerable or which compound or increase other environmental impacts." Cal. Code Regs. tit.14, § 15355(a); Cal. Code Regs. tit.14, § 15355(b); *see also, Ass'n of Irritated Residents v. Cnty. of Madera*, 133 Cal. Rptr. 2d 718, 734 (Cal Ct. App. 2003) (EIR must assess "cumulative damage as a whole greater than the sum of its parts"). It requires a cumulative impact analysis that considers "closely related past, present, and reasonably foreseeable probable future projects." Cal. Code Regs. tit.14, § 15355.

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[19] 23 U.S.C. §134(h)(1)(D), (F).
[20] 23 U.S.C. §134(i)(2)(F).
[21] *Available at* http://apps.mtc.ca.gov/meeting_packet_documents/agenda_2089/3c_Final_PBA.pdf.
[22] *Available at* http://apps.mtc.ca.gov/meeting_packet_documents/agenda_2089/3c_Final_PBA.pdf.
[23] Southern California Association of Governments, Regional Transportation Plan 2012-2035 (Adopted April 4, 2012); *available at* http://www.scagrtp.net/.; attached in Appendix to Comment Letter
[24] http://www.scagrtp.net/content?c=02&s=06
[25] http://www.scagrtp.net/content?c=02&s=06

B50-20 In this instance, a comprehensive cumulative analysis would involve consideration of how goods movement issues (i.e., trends showing an increase in truck and rail traffic, and a corresponding increase in emissions) would interact and impact other aspects of the Plan, such as the Plan's proposals for highway transportation investments and the Plan/EIR's analysis of air quality and greenhouse gas emissions. MTC and ABAG have made passing reference to certain cumulative impacts, such as how goods movement and air quality concerns might fit together:

> Air quality considerations related to goods movement activities in the region also must be addressed in coordination with the larger goods movement and industrial lands discussions and how goods movement and the retention of industrial lands relates to other transportation sectors and air quality impacts on other uses including residential uses along goods movement corridors.[26]

B50-21 Yet, they are far from satisfying their obligations under CEQA – the agencies are required to assess the cumulative impacts of all aspects of the Plan, including but not limited to transportation investments, to land use decisions, to greenhouse gas emissions, in connection with each other.

Considering air quality impacts as an example, the impacts from goods movement and other components of the Plan present two or more individual effects which may be considerable when assessed together or may compound or increase other impacts. Air impacts are a classic example of impacts which may be insignificant when considering emissions from one source or project, but "assum[e] threatening dimensions only when considered in light of the other sources with which they interact.'" *Kings County Farm Bureau*, 270 Cal. Rptr. at 662 (quoting Selmi, *The Judicial Development of the California Environmental Quality Act* 18 U.C. Davis L. Rev. 197, 244 (1984)). The impacts from the goods movement and industrial lands retention implementation measure will produce an incremental impact that should be analyzed in relation to the other impacts projected under the Plan to determine the nature and scope of the environmental changes that will actually occur.

B50-22 The EIR also fails to provide a list of "past, present, and probable future projects" or a summary of projections from an adopted general plan, related planning documents, or environmental documents, that was considered when performing the cumulative impact analysis, as required by section 15130(b)(1) of the CEQA Regulations. This violates the CEQA Guidelines which state that either the list of projects or summary of projections must appear in the EIR as one of the "elements necessary to an adequate discussion of cumulative impacts." Cal. Code Regs. tit.14, §15130(b)(1); *see also, San Joaquin Raptor/Wildlife Rescue Ctr. v. Cnty. of Stanislaus*, 32 Cal. Rptr. 2d 704, 720 (Cal. Ct. App. 1994) (holding that the EIR "does not comply with CEQA because it fails to contain a list of 'past, present and reasonably anticipated future projects,' or a summary of projections contained in an adopted general plan for a summary of cumulative development."); *see also, Kings County Farm Bureau v. City of Hanford*, 270 Cal. Rptr. 650, 668 (Cal. Ct. App. 1990). The EIR suggests that the size and the scope of the Plan allow it to only consider impacts from the project itself. The EIR states that all of the impacts it considers in each section are cumulative impacts due to the project's timeline and latitude.[27] Yet, the CEQA Guidelines do not provide an exemption from the requirement to provide a list or summary of projections if a project is long-term and far-reaching. A "[c]umulative impact analysis is necessary because the full environmental impact of a proposed project cannot be gauged in a vacuum." *Communities for a Better*

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[26] Plan Bay Area: Final Adoption (MTC Resolution No. 4111, ABAG Resolution No. 06-13) (July 5, 2013), *available at,* http://apps.mtc.ca.gov/meeting_packet_documents/agenda_2089/3c_Final_PBA.pdf.

[27] Plan Bay Area Draft EIR, Part Two: Setting, Impacts, and Mitigation Measures, Chapter 2.6: Noise, pg. 2.6-21 ("The analysis herein uses a horizon year of 2040 and includes region-wide vehicle miles travelled assumptions and therefore represents a cumulative analysis.").

B50-23 *Env't v. California Res. Agency*, 126 Cal. Rptr. 2d 441, 452 (Cal. Ct. App. 2002). Here, the EIR enumerates the Plan's impacts in a vacuum and fails to provide any information on other projects that contribute to cumulative impacts in the region. The EIR's analysis can hardly be called a "cumulative impact analysis" and is a grave violation of CEQA.

B50-24 The Plan's forward-looking language with regard to goods movement activities and MTC's work with Caltrans and County CMAS does not elide MTC and ABAG's obligation to analyze the impacts of goods movement and industrial land retention in the EIR. The agencies cannot rely on the promise of future study of impacts of goods movements issues to excuse their obligations – the agencies are required by CEQA to study goods movements issues and include that analysis in the EIR to the extent practicable. *See Friends of the Eel River v. Sonoma Cnty. Water Agency*, 134 Cal. Rptr. 2d 322, 330 (Cal. Ct. App. 2003); *see also, Citizens To Pres. the Ojai v. Cnty. of Ventura*, 222 Cal. Rptr. 247, 250 (Cal. Ct. App. 1985)(regardless of whether a technical analysis of the cumulative impacts is feasible, the agency has an obligation to consider the impacts and should conduct as precise a study as possible for the EIR). Indeed, CEQA guidelines acknowledge that preparing an EIR "necessarily involves some degree of forecasting" and stresses that "an agency must use its best efforts to find out and disclose all that it reasonably can." Cal. Code. Regs. tit. 14, § 15144. However, here, MTC and ABAG did not even attempt to consider the cumulative impacts of the plan in combination with goods movement in the Bay Area.

B50-25 An EIR is intended to be "an informational document which will inform public agency decision-makers and the public general of the significant environment effect of a project…" and it cannot serve this purpose when the agency fails to include a complete analysis of the project's cumulative effects on the environment. For this reason, "it is vitally important that an EIR avoid minimizing the cumulative impacts. Rather, it must reflect a conscientious effort to provide public agencies and the general public with adequate and relevant detailed information about them." *San Franciscans for Reasonable Growth v. City & Cnty. of San Francisco*, 198 Cal. Rptr. 634, 643 (Cal. Ct. App. 1984). Here, the EIR's failure to provide a legally adequate, complete analysis of cumulative impacts thwarts CEQA's goals of informed decisionmaking and public participation.

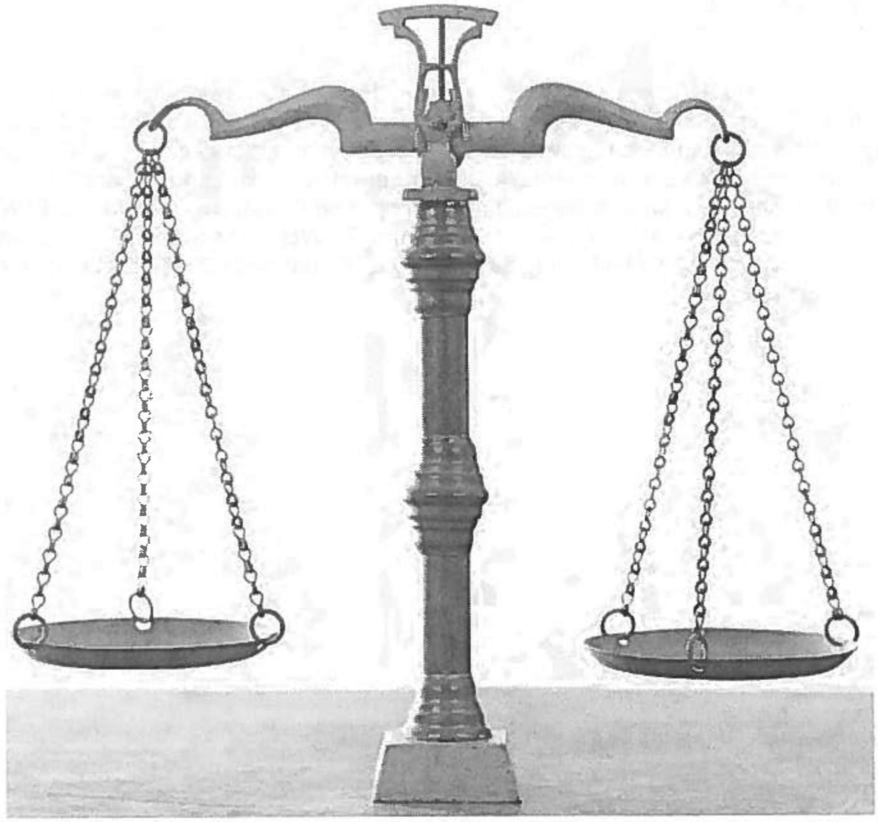
2. Conclusion

B50-26 The Plan and EIR should account for the effects that goods movement issues will have on the region – information already available to the agencies shows that the volume of goods moved through the region will increase over time, and that low-income and minority communities are disproportionately affected by the transportation of goods.

Yet, the Plan and EIR are devoid of any meaningful analysis of goods movement issues, in violation of MTC and ABAG's obligations under state and federal law. Thus, the MTC and ABAG must redo their Environmental Impact Report to include a complete goods movement analysis.

Sincerely,

Irene Gutierrez
Will Rostov
Counsel for Communities for a Better Environment



Reducing Air Emissions Associated With Goods Movement: Working Towards Environmental Justice

NOVEMBER 2009

A Report of Advice and Recommendations
of the
National Environmental Justice Advisory Council
A Federal Advisory Committee to the U.S. Environmental Protection Agency

ACKNOWLEDGEMENTS

The National Environmental Justice Advisory Council (NEJAC) acknowledges the efforts of the Goods Movement Work Group (GMWG) in preparing the initial draft of this report. The NEJAC also acknowledges the stakeholders and community members who participated in the GMWG's study by providing public comments. Environmental justice communities, regulatory organizations, environmental groups, and other interested parties worked long and hard on this study. The staff of EPA's Office of Environmental Justice, especially Victoria Robinson, the GMWG's Designated Federal Officer, spent many hours meeting with the GMWG, ably assisted by EPA staff and ICF International, Inc, which provided contractor support.

DISCLAIMER

Reducing Air Emissions Associated With Goods Movement: Working Towards Environmental Justice

NOVEMBER 2009

A Report of Advice and Recommendations
of the
National Environmental Justice Advisory Council
A Federal Advisory Committee to the U.S. Environmental Protection Agency

NATIONAL ENVIRONMENTAL JUSTICE ADVISORY COUNCIL

<u>Executive Council</u>

- Richard Moore, Southwest Network for Environmental and Economic Justice (NEJAC Chair)
- Don Aragon, Wind River Environmental Quality Commission
- Chuck Barlow, Entergy Corporation
- Sue Briggum, Waste Management, Inc.
- Peter Captain, Sr., Tanana Chiefs Council
- Jolene Catron, Wind River Alliance
- Wynecta Fisher, New Orleans Mayor's Office of Environmental Affairs
- Jodena Henneke, Texas General Land Office
- M. Kathryn Brown, University of Cincinnati College of Medicine
- William Harper, Pacific Gas and Electric Company
- Christian Holmes, Global Environment and Technology Foundation
- Hilton Kelly, Community In-Power Development Association, Inc.
- J. Langdon Marsh, Portland State University, National Policy Consensus Center
- Gregory Melanson, formerly with Bank of America
- Paul Mohai, University of Michigan School of Natural Resources & Environment
- Patricia E. Salkin, Albany Law School
- Shankar Prasad, Coalition for Clean Air
- John Ridgway, Washington State Department of Ecology
- John Rosenthall, National Small Town Alliance
- Omega Wilson, West End Revitalization Association
- Elizabeth Yeampierre, UPROSE
- Victoria Robinson, NEJAC Designated Federal Officer (DFO), U.S. Environmental Protection Agency, Office of Environmental Justice

<u>Goods Movement Work Group *</u>

- Shankar Prasad, M.B.B.S, Coalition for Clean Air (*Work Group Co-Chair*)
- Terry Goff, Caterpillar Inc. (*Work Group Co-Chair*)
- Margaret Gordon, West Oakland Environmental Indicators Project
- Andrea Hricko, Community Outreach and Education Program, Southern California Environmental Health Sciences Center and Children's Environmental Health Center based at Keck School of Medicine, University of Southern California
- Angelo Logan, East Yard Communities for Environmental Justice
- Kirk Marckwald, California Environmental Associates **
- J. Langdon Marsh, National Policy Consensus Center, Portland State University
- Cynthia Marvin, California Air Resources Board
- Gregory Melanson, Formerly with Bank of America
- Wayne Grotheer, Port of Seattle
- Omega Wilson, West End Revitalization Association
- Victoria Robinson

* *The following individuals participated briefly in early discussions of the Work Group but were not part of the group that finalized the Report: Joyce King, Mohawk Council of Akwesasne; and Aston Hinds, Port of Houston.*

** *Mr. Kirk Marckwald, California Environmental Associates, also served as a member of the GMWG from June 2007 through May 2009. His knowledge and experience gained from working with different railroads as a consultant to the American Association of Railroads (AAR) allowed Mr. Marckwald to actively participate in the meetings and deliberations of the GMWG. After the conclusion of the deliberations on this report and its recommendations, Mr. Marckwald informed the GMWG that his client, AAR, requested that Mr. Marckwald's name be deleted from the list of members of the GMWG. In addition, although there was no request for endorsement of the report by any organization with which any work group member is affiliated, the AAR informed the GMWG that AAR could not achieve consensus to endorse the report.*

NATIONAL ENVIRONMENTAL JUSTICE ADVISORY COUNCIL

November 20, 2009

Lisa P. Jackson
Administrator
U.S. Environmental Protection Agency
1200 Pennsylvania Avenue, NW (MC1101A)
Washington, D.C. 20460

Dear Administrator Jackson:

The National Environmental Justice Advisory Council (NEJAC) is pleased to submit the report, *Reducing Air Emissions Associated with Goods Movement: Working towards Environmental Justice* (November 2009), for the Agency's review. This report contains advice and recommendations about how the Agency can most effectively promote strategies, in partnership with federal, state, tribal, and local government agencies, and other stakeholders, to identify, mitigate, and/or prevent the disproportionate burden on communities of air pollution resulting from goods movement. With these recommendations, the Council wishes to:

- Provide a clear focus on the need to protect human health within communities impacted by exposure to air emissions from goods movement facilities and activities; and
- Convey a sense of urgency toward taking action for reducing exposure to air emissions in communities prioritized for action; and
- Emphasize differential approaches needed when addressing impact mitigation between existing and new goods movement facilities or activities.

The following is the list of key recommendations proposed by the NEJAC:

- Increase impacted communities' capacity and effectiveness to engage in and influence decisions related to goods movement that impact them;
- Direct each of the ten regions of EPA to identify and prioritize areas or communities maximally exposed or affected by goods movement related facilities and activities for taking action;
- Initiate mechanisms, processes and venues for reaching agreements on actions needed to reduce health impacts from goods movement in the identified communities;
- Accelerate introduction of existing, cleaner technologies and systems by providing needed resources using incentives, regulatory actions, modifying

existing funding and financing programs, creating new funding mechanisms, and offering technical assistance; and

- Support additional research and data gathering, with full community involvement and participation to accelerate emission reduction from goods movement activities.

Sincerely,

Elizabeth Yeampierre
Acting Co-Chair

John Ridgway
Acting Co-Chair

cc: Richard Moore, NEJAC Chair
NEJAC Members
NEJAC Goods Movement Work Group Members
Charles Lee, Director, Office of Environmental Justice (OEJ)
Victoria Robinson, NEJAC DFO, OEJ]

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APPENDICES

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Reducing Air Emissions Associated With Goods Movement: Working Towards Environmental Justice

A Report of Advice and Recommendations of the National Environmental Justice Advisory Council

1. INTRODUCTION

The National Environmental Justice Advisory Council (NEJAC) is a Federal advisory committee chartered pursuant to the Federal Advisory Committee Act (FACA) to provide advice and recommendations to the Administrator of the U.S. Environmental Protection Agency (EPA or the Agency) about matters of environmental justice.[1] Environmental justice is the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies.

In June 2007, EPA requested that the NEJAC "provide advice and recommendations about how the Agency can most effectively promote strategies, in partnership with federal, state, tribal, and local government agencies, and other stakeholders, to identify, mitigate, and/or prevent the disproportionate burden on communities of air pollution resulting from goods movement."

The NEJAC asked EPA to establish the Goods Movement Work Group (GMWG) to research and identify potential recommendations. The GMWG was comprised of public and private sector stakeholders. A list of members is shown behind the title page of this report. The GMWG members met in person and via conference call on a regular basis to develop recommendations. The NEJAC also obtained public comments from additional stakeholders, including community groups, in public meetings on September 18, 2007, June 20, 2008, and October 21, 2008.

In accordance with EPA's request, the recommendations in this report primarily focus on methods to reduce air pollution from goods movement and its impacts on environmental justice communities near air and marine ports, rail yards, highways, bridges, border crossings, and distribution centers. The NEJAC understands that other environmental and quality-of-life issues exist due to goods movement activities. While such concerns are not directly addressed, some quality-of-life issues might be indirectly improved through the implementation of these recommendations (e.g., less truck idling at freight facilities will reduce both air pollution and noise).

What is Goods Movement?

Goods movement refers to the distribution of freight (including raw materials, parts, and finished consumer products) by all modes of transportation, including marine, air, rail, and truck. Goods movement facilities, also called freight facilities, include seaports, airports, and land ports of entry (border crossings), rail yards and rail lines, highways and high truck traffic roads, and warehouse and distribution centers. The terms goods movement and freight transport are used interchangeably in this report.

Premise for Recommendations

Based on EPA's "Draft Charge for Developing Recommendations to Address the Air Quality Impacts of Goods Movement on Communities" (June 4, 2007), the NEJAC (and its Work Group) considered the following as the starting point to resolve controversies and formulate recommendations for further EPA actions:

There are serious public health concerns associated with goods movement due to high levels of air pollution and its associated health effects. The distribution of freight (goods movement) in the U.S. involves an entire system of transportation facilities, including seaports, airports, railways, truck lanes, logistics centers, and border

[1] See www.epa.gov/environmentaljustice/nejac/

crossings. The vehicles and equipment that move goods today are predominantly powered by large diesel engines that emit particulate matter (PM), nitrogen oxides (NOx) that form ozone and fine particles in the atmosphere, hydrocarbons, and other air toxics. These air pollutants contribute to respiratory illness, heart disease, cancer, and premature death.

The environmental, public health and quality-of-life impacts of goods movement on communities are more pronounced in areas with major transportation hubs and high traffic roads. Minority and low-income communities near these hubs and throughways bear disproportionate impacts because of their close proximity to multiple pollution sources.

EPA asked the NEJAC to identify and summarize the most significant community environmental and/or public health concerns related to air pollution from goods movement activities. The Agency also suggested that the report address the types of data and tools that can be used to determine the location and magnitude of disproportionate impacts of air pollution related to goods movement activities on communities.

EPA has already made substantial efforts to reduce emissions from diesel engines, including those used for goods movement. These efforts include engine emission standards, incentives and other financial models, port emission inventories, and use of facility Environmental Management Systems.

Other government agencies, the freight industry, and affected communities have made progress in reducing diesel emissions from goods movement in many locations, but more must be done to meet health goals and fulfill EPA's commitment to ensure environmental justice. EPA suggests that the NEJAC "Specifically, identify the venues and other mechanisms that EPA can use to work with other government agencies, industry, and communities, in areas such as environment, public health, transportation, and/or land use, to reduce community exposure to air pollution from goods movement activities."

With this suggestion, EPA explicitly encouraged the NEJAC to expand the scope of recommended strategies to include not only what EPA can do under its own authority and funding, but also what EPA can accomplish by: (a) influencing other agencies at all levels of government; (b) leveraging change in the freight industry, and (c) empowering effective community involvement and action.

The charge implicitly recognizes the need to complement national (and international) actions with local and regional-scale strategies to further cut exposure in impacted communities. For example, land use and transportation infrastructure decisions can play a critical role in mitigating (or exacerbating) exposure to goods movement pollution in nearby communities– these decisions must be addressed in the recommendations.

This report is organized into three primary sections. Following this introduction in Section 1, Section 2 provides brief background about goods movement, air quality, health impacts, and the existing regulatory environment. Section 3 presents recommendations for each of seven focus areas where EPA can play a role in reducing goods movement air emission impacts. These focus areas include:

- Effective Community Engagement
    a. Community facilitated strategies
    b. Collaborative Governance
- Health Research Gaps and Educational Needs
- Regulatory and Enforcement Mechanisms
- Land Use
- Technology
- Environmental Management and Performance
- Financing

Appendix A provides the EPA charge to the NEJAC as well as NEJAC's charge to the Goods Movement Work Group. Appendix B provides a list of acronyms and a glossary of key terms. Appendix C includes a list of related recommendations, prepared by other EPA federal advisory committees, which relate to environmental justice and air quality from freight movement.

2. BACKGROUND

This section provides an overview of the current and future scope of goods movement operations in the United States, as well as the resulting air pollution emissions and regulatory structures to address those emissions.

2.1 Scope of Goods Movement

The U.S. has an extensive network of infrastructure to support goods movement, including highways, bridges, border crossings, air and marine ports, rail lines, rail yards, and distribution centers. Goods movement activities have increased significantly in the past 20 years. Container shipments quintupled at the ten largest U.S. container ports from 1980 to 2006, and over the last decade alone, shipments have grown by 81 percent.[2] The Federal Highway Administration (FHWA) forecasts that between 2006 and 2035:

- Freight tonnage hauled by trucks will grow by 80 percent;
- Rail tonnage hauled will grow by 73 percent;
- Water transportation tonnage will increase by 51 percent;
- Intermodal tonnage will increase by 73 percent; and
- Air cargo tonnage will quadruple.[3]

Although many freight facilities have experienced a decline in cargo volume due to the current recession, freight traffic is anticipated to continue to increase over the long-term as the U.S. population grows and consumes more goods. Increased demand for domestic and foreign goods is expected to result in the expansion of existing infrastructure or the development of new infrastructure to move freight faster and more reliably.

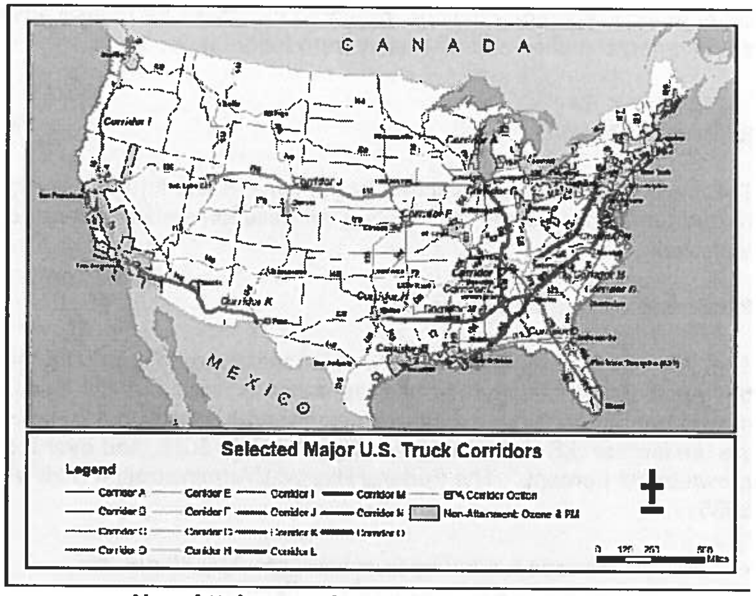
2.2 Air Pollution from Goods Movement

The ships, harbor craft, trucks, locomotives, aircraft and cargo handling equipment used to move goods in the U.S. typically rely on large, long-lived engines that burn diesel fuel (or similar fuels). These diesel engines emit soot particles and gases. Some of these gases are precursor compounds that can then react in the atmosphere with chemicals from other types of sources to form secondary air pollutants, like ozone and gaseous fine particles.

The pollutants increase the health risks for communities near goods movement facilities in two ways – by directly exposing people living or working in close proximity to the source, and by elevating levels of regional air pollutants (like fine particles and ozone) that affect an even larger population. For regional air pollutants, EPA sets national ambient air quality standards intended to protect public health with a margin of safety, as required by law. Burning fossil fuels to power goods movement engines also produces greenhouse gases that contribute to global climate change

[2] Cannon, James. U.S. Container Ports and Air Pollution: A Perfect Storm. 2008
[3] U.S. Federal Highway Administration. 2007 Freight Facts and Figures. http://www.ops.fhwa.dot.gov/freight/freight_analysis/nat_freight_stats/docs/07factsfigures/pdf/fff2007.pdf

Emissions from diesel engines are complex mixtures consisting of a wide range of compounds including: directly emitted organic and black carbon, toxic metals, and other particulate matter (PM), plus gases like nitrogen oxides (NOx), sulfur oxides (SOx), volatile organic compounds (VOC), carbon monoxide (CO), formaldehyde, acrolein, and polycyclic aromatic hydrocarbons (PAH). While there are numerous hazardous chemicals in diesel exhaust, this report will focus on the impacts from emissions of direct PM, NOx, and SOx, as well as the resulting ozone and fine particle pollution formed in the atmosphere.



Non-Attainment Areas and Truck Routes

Particulate matter. Particulate matter is made up of tiny particles of solid or liquid suspended in a gas. Very small particles are directly emitted as a by-product of incomplete fuel combustion in an engine, and larger particles result from brake and tire wear. Diesel PM consists of a "core" of black elemental carbon with a coating of organic material and sulfates. Fine particulate matter (2.5 microns or less in diameter), known as PM2.5, includes directly emitted PM plus gaseous particles formed in the atmosphere from emissions of NOx or SOx and ammonia. EPA sets ambient air quality standards for PM2.5, as well as the coarser PM10 that is dominated by dust. California also regulates the subset of diesel PM as an air toxic.

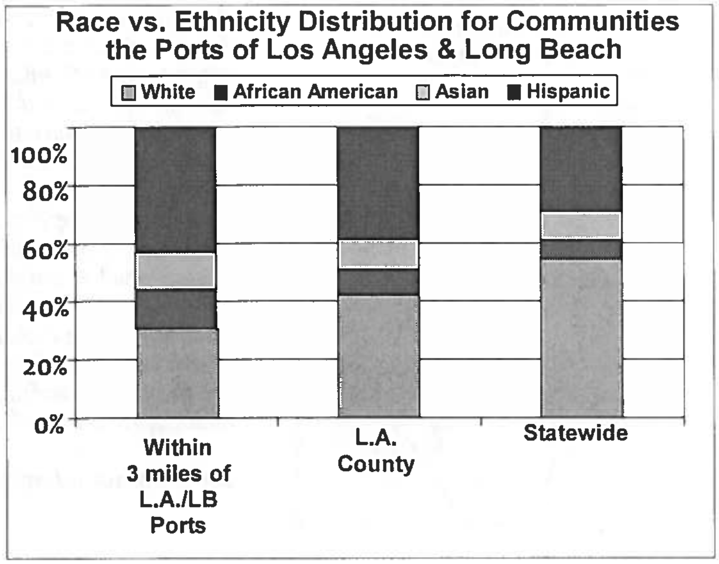
Nitrogen Oxides and Sulfur Oxides. Emissions of both NOx and SOx can be directly associated with health effects or act as precursors for other secondary pollutants formed in the atmosphere. NOx compounds contribute to formation of both ozone and PM2.5. NOx reacts with ammonia, moisture, and other compounds to form nitric acid and related particles. In California, ammonium nitrate from NOx is the primary constituent of fine particles in the South Coast and San Joaquin Valley, which experience severe PM2.5 pollution levels. In the Eastern U.S., SOx is the more significant contributor to secondary PM2.5 levels. NOx can also react with VOCs to create ground-level ozone in the presence of sunlight. EPA establishes ambient air quality standards for ozone, nitrogen dioxide (NO2) and sulfur dioxide (SO2).

Air Toxics. Diesel exhaust includes more than 40 substances that are listed as hazardous air pollutants by EPA and are considered "cancer causing" by the California Environmental Protection Agency (CalEPA). Air toxics are chemicals known or suspected to cause cancer or other serious health effects, such as reproductive mutations or birth defects.

2.3 Health Impacts Due to Air Pollution from Goods Movement [4]

Diesel and other emissions from port and goods movement activities have significant human health and environmental impacts in onshore communities. These impacts include increased cancer rates, asthma, other respiratory and cardiovascular diseases, and premature death. Port and goods movement emissions also contribute to the formation of ground level ozone. Diesel engines at ports, rail yards and along truck routes create emissions that affect the health of workers and people living in nearby

[4] The first two paragraphs below are taken verbatim from: U.S. EPA Inspector General, *EPA Needs to Improve Its Efforts to Reduce Air Emissions at U.S. Ports, 09-P-0125,* March 23, 2009 http://www.epa.gov/oig/reports/2009/20090323-09-P-0125.pdf



communities, and contribute significantly to regional air pollution. EPA has determined that diesel exhaust is "likely to be carcinogenic to humans by inhalation" and that this hazard applies to environmental exposures.[5]

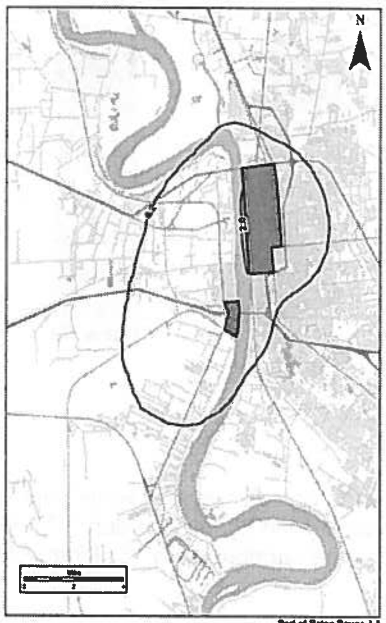
Recent studies show that populations living near large diesel emission sources such as major roadways,[6] rail yards, and ports[7] are likely to experience greater diesel exhaust exposure levels than the overall U.S. population, exposing them to greater health risk. For example, according to the California Air Resources Board, nearly 60 percent of the 2 million people living in the area around the Ports of Los Angeles and Long Beach have a potential cancer risk of greater than 100 in 1 million (due in part to port emissions), while over 410,000 people living closest to the same ports have a cancer risk greater than 200 in 1 million.[8] These cancer risk calculations are based on a unit risk value for diesel particulate adopted by the California Air Resources Board (CARB).

A significant body of peer-reviewed research studies now shows that air pollutants are higher in close proximity to mobile sources, such as highways.[9,10] A report issued by the Health Effects Institute (HEI) in May 2009 concluded that: *"Traffic-related pollutants impact ambient air quality on a broad spatial scale, ranging from roadside to urban to regional background. Based on a synthesis of the best available evidence, we identified an exposure zone within a range of up to 300 to 500 meters from a major road as the area most highly affected by traffic emissions."*[11] Several peer-reviewed articles have summarized the evidence about health effects in proximity to traffic-related air pollution[12,13,14] including studies showing an

[5] U.S. EPA (2002). *Health Assessment Document for Diesel Engine Exhaust*, prepared by the National Center for Environmental Assessment, Washington, DC, for OTAQ; EPA/600/8-90/057F.
[6] Kinnee, E. J., J.S. Touman, R. Mason, J. Thurman, A. Beidler, C. Bailey, R. Cook. *Allocation of on-road mobile emissions to road segments for air toxics modeling in an urban area.* Transport. Res. Part D 9: 139150, 2004.
[7] California Air Resources Board (CARB), *Roseville Rail Yard Study*, October 14, 2004; and CARB, *Diesel Particulate Matter Exposure Assessment Study for the Ports of Los Angeles and Long Beach*, April 2006. See: http://www.arb.ca.gov/railyard/hra/hra.htm
[8] California Air Resources Board (CARB), *Roseville Rail Yard Study*, October 14, 2004; and CARB, *Diesel Particulate Matter Exposure Assessment Study for the Ports of Los Angeles and Long Beach*, April 2006. See: http://www.arb.ca.gov/railyard/hra/hra.htm

[9] Zhu Y, Hinds WC, Seongheon K et al. Study of ultrafine particles near a major highway with heavy-duty diesel traffic. Atmos Envir 36 (2002) 4323–4335
[10] Greco SL, Wilson AM, Hanna SR et al. Factors influencing mobile source particulate matter emissions-to-exposure relationships in the Boston urban area. Environ. Sci. Technol. 2007, 41, 7675-7682.
[11] Health Effects Institute. Traffic-Related Air Pollution: A Critical Review of the Literature on Emissions, Exposure, and Health Effects. Special Report #17, 2009. Available at: http://pubs.healtheffects.org/view.php?id=306.
[12] Boothe ,V.L.; Shendell, D.G. "Potential health effects associated with residential proximity to freeways and primary roads: review of scientific literature, 1999 – 2006, Journal of Environmental Health. 2008, 70(8): 33-41

Concentration Isopleths for Baton Rouge, LA



Port of Baton Rouge, LA

increase in asthma and reduced lung function among children living in close proximity to traffic-related pollution.[15,16] With regard to health effects, the HEI Report concluded that "*Evidence was "sufficient" to infer a causal relationship between exposure to traffic-related air pollution and exacerbation of asthma and "suggestive" to infer a causal relationship with onset of childhood asthma, non-asthma respiratory symptoms, impaired lung* function, and total and cardiovascular mortality." In the same HEI Report, the HEI writers pointed out that, "Our conclusions have to be considered in the context of the progress made to reduce emissions from motor vehicles. Since the epidemiologic studies are based on past estimates of exposure, they may not provide an accurate guide to estimating health associations in the future."[17]

2.4 Community Impacts and Environmental Justice

As described above, good movement-related activities can have negative impacts on air quality and public health. Adjacent communities bear the burden of such activities resulting from the growth and demand for goods. Across the country, there are many communities near goods movement infrastructure that consist of large populations of low-income and minority residents. These environmental justice communities tend to have greater exposure to poor air quality as a result of diesel emissions from transportation facilities with high traffic density[18,19]. This increased exposure may result in higher incidences of the health impacts described above in Section 2.3 among low-income and minority residents. As shown in Figure 1 to the right, the communities closest to the ports in southern California have a higher percentage of minority residents.

More recently, CARB released several additional rail yard health risk assessments, which all show that diesel PM emissions (from trucks, locomotives and yard equipment) result in higher risks of lung cancer in

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[13] Salam, M.T.; Islam, T.; Gilliland, F.D. (2008). Recent evidence for adverse effects of residential proximity to traffic sources on asthma. Current Opinions in Pulmonary Medicine 14: 3-8.

[14] HEI. Traffic-Related Air Pollution: A Critical Review of the Literature on Emissions, Exposure, and Health Effects. Special Report #17, 2009.

[15] Gauderman W, Vora H, McConnell R, et al. The Effect of Exposure to Traffic on Lung Development from 10 to 18 Years of Age. Lancet 2007; 367:571-77

[16] McConnell R, Berhane K, Yao L et al. Traffic, susceptibility, and childhood asthma. Environ Health Perspectives. 2006 May; 114(5): 766-72.

[17] HEI. Traffic-Related Air Pollution: A Critical Review of the Literature on Emissions, Exposure, and Health Effects. Special Report #17, 2009, page 7-25.

[18] U.S. EPA. Control of Hazardous Air Pollutants from Mobile Sources: Regulatory Impact Analysis. February 2007

[19] Environmental Protection Agency. Control of Emissions of Air Pollution From Locomotive Engines and Marine Compression-Ignition Engines Less Than 30 Liters per Cylinder. Federal Register: June 30, 2008 (Volume 73, Number 126). Page 37100.

nearby communities.[20] The highest cancer risk was found among residents living across the street from a rail yard in San Bernardino, estimated at a risk of 3,000 out of one million (based on a 70-year exposure). The City of San Bernardino has a population of over 185,000 residents of which approximately 28 percent live below the Federal poverty level compared to the national individual poverty rate of 12 percent. In addition, the median family income in the city is $16,689 less than the national average of $50,046 according to the 2000 Census.

EPA recently analyzed a representative selection of national marine port areas and rail yards in order to understand the populations that are exposed to diesel emissions from these facilities,[21] using geographic information system (GIS) tools and census information.[22] The analysis showed, for example, that in Chicago the population living adjacent to the Barr Rail Yard, which has the greatest exposure to diesel emissions from that yard, is 97 percent African-American, while the general metropolitan area of Chicago is only 18 percent African-American.[23]

The EPA analysis shows that – across the country – the populations near major goods movement facilities are often minority and low-income communities.[24] Goods movement facilities may also be located near other industrial facilities and thus may contribute to existing local air quality problems. For example, in Houston, Texas, more than 20 percent of the area's largest industrial emission sources are located in East Houston, where the Port of Houston and the shipping channel that feeds it are located. Additionally, four major highways intersect this area resulting in high traffic density and additional air pollutant emissions. East Houston neighborhoods, which are predominantly minority and low-income communities, have the highest concentrations of air pollutants in Houston.[25] In California, Mira Loma, San Bernardino, Wilmington, Long Beach, Commerce, and Oakland are examples of environmental justice communities that are affected by emissions generated from marine port and locomotive related activities, distribution centers, and other transportation facilities associated with freight hubs.

The environmental, public health, and quality-of-life impacts of goods movement activities on communities are more pronounced in areas with major transportation hubs and heavily trafficked roads. Local areas with elevated levels of air pollution are of great concern to EPA and other environmental health agencies. The research described above shows that minority and low-income communities living near transportation hubs bear a disproportionate share of the environmental impacts because of their close proximity to multiple pollution sources.

2.5 Legal and Regulatory Environment

Air Quality. Under the federal Clean Air Act, EPA regulates air quality in the U.S. through the establishment of national ambient air quality standards for certain pollutants, including ozone, particulate matter, nitrogen dioxide, sulfur dioxide, and carbon monoxide. Regions that record air pollution levels above these standards are called "nonattainment" areas. States with designated nonattainment areas must prepare air quality plans, or State Implementation Plans (SIP), that identify the emission reductions needed to attain the standards and the control measures that will achieve those reductions.

[20] These studies are available at http://www.arb.ca.gov/railyard/hra/hra.htm

[21] ICF International. September 28, 2007. Estimation of diesel particulate matter concentration isopleths for marine harbor areas and rail yards. Memorandum to EPA under Work Assignment Number 0-3, Contract Number EP-C-06-094. This memo is available in Docket EPA-HQ-OAR-2003-0190.

[22] The Agency selected a representative sample of the top 150 U.S. ports including coastal, inland, and Great Lake ports. In selecting a sample of rail yards the Agency identified a subset from the hundreds of rail yards operated by Class I Railroads.

[23] ICF International. September 28, 2007. Estimation of diesel particulate matter concentration isopleths for marine harbor areas and rail yards. Appendix H. Memorandum to EPA under Work Assignment Number 0-3, Contract Number EP-C-06-094. This memo is available in Docket EPA-HQ-OAR-2003-0190.

[24] Ibid.

[25] See http://www.epa.gov/ttn/chief/conference/ei16/session6/bethel.pdf

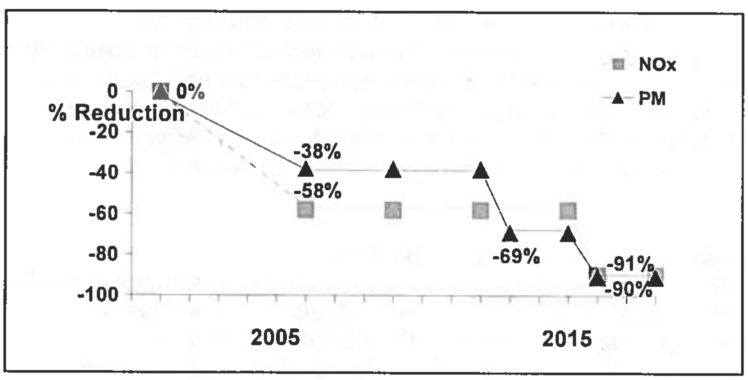
A 2009 report by EPA's Office of the Inspector General noted that 31 U.S. seaports were located in nonattainment areas for ozone, PM2.5 or both, and projected that number would rise once EPA designated additional counties as nonattainment for the more health-protective 8-hour ozone standard established in March 2008.[26]

EPA and other air agencies have legal obligations to show continued progress in reducing air pollution emissions to meet ambient air quality standards, reduce exposure to air toxics, and achieve other health goals. Regulatory actions to control emissions from pollution sources provide the foundation for this progress, supplemented with voluntary initiatives.

Legal Authority and Recent Progress. Regulatory oversight of air emissions from goods movement sources is divided among international, national, tribal, state, regional, and local agencies. Typically, each agency enforces its own regulations and standards. Agencies at multiple levels may choose to share enforcement responsibility to increase monitoring or field inspections with the goal of improving compliance.

International. At the international level, ocean going ships (including foreign flagged) are subject to the rules of the International Maritime Organization (IMO) and its International Convention on the Prevention of Pollution from Ships. The U.S. Coast Guard serves as the lead agency for the U.S. delegation to the IMO. Representatives from EPA are invited to attend as part of the delegation. In October 2008, the IMO adopted tighter standards for ship engines and their fuels, set to phase in over the next decade. In regions with severe pollution problems, these requirements can be accelerated through establishment of Emission Control Areas (ECA) by the IMO. EPA has applied to the IMO for an ECA designation for the U.S. and Canadian coasts in cooperation with Environment Canada[27].

International aircraft are regulated by the International Civil Aviation Organization, with the U.S. Federal Aviation Administration leading the U.S. effort. International truck movements are subject to oversight under specific cross-national border initiatives or state actions to ensure international trucks meet U.S. emission standards.



EPA Line-Haul Locomotive Standards: Reductions from Uncontrolled Levels

[26] U.S. EPA Inspector General, *EPA Needs to Improve Its Efforts to Reduce Air Emissions at U.S. Ports, 09-P-0125,* March 23, 2009 http://www.epa.gov/oig/reports/2009/20090323-09-P-0125.pdf
[27] For additional information about the ECA application to the IMO, see http://www.epa.gov/otaq/regs/nonroad/marine/ci/420f09015.htm

Photo by Andrea Hricko, USC

National. The federal Clean Air Act (CAA) and the National Environmental Policy Act (NEPA) provide legal authority to regulate and mitigate the impacts of emissions from goods movement in the U.S.

At the national level, EPA (in consultation with other federal agencies) is responsible for regulating emissions from trucks, locomotives, harbor craft, yard equipment, marine vessels and harbor craft, aircraft, and fuels under the CAA. EPA has promulgated mobile source regulations, including more stringent tailpipe emissions standards for new equipment (like trucks, locomotives, harbor craft, and cargo equipment) and requirements for the use of cleaner fuels, among other actions. Progress in reducing diesel emissions will be substantial over the next decade as new and rebuilt engines are introduced. However, the long life of these engines means that old, high-emitting, less-efficient technology will continue to operate for years to come.

By providing information, incentives, and financial assistance, EPA is working to encourage firms to adopt clean technologies that meet or surpass regulatory standards. The National Clean Diesel Campaign is an umbrella initiative that aims to reduce diesel emissions from various sectors, including trucks, locomotives, ships, and cargo handling equipment. EPA's Sector Strategy Program also works with industry to achieve sector-wide environmental goals. For example, EPA has encouraged ports to measure their environmental impact with emissions inventories and to deploy environmental management systems (EMS).

Freight transportation planning and infrastructure development are regulated by various departments of the U.S. Department of Transportation (DOT) including the Federal Highway Administration (FHWA), the Federal Railroad Administration (FRA), and the Federal Aviation Administration (FAA); as well as the Army Corps of Engineers and the U.S. Coast Guard.

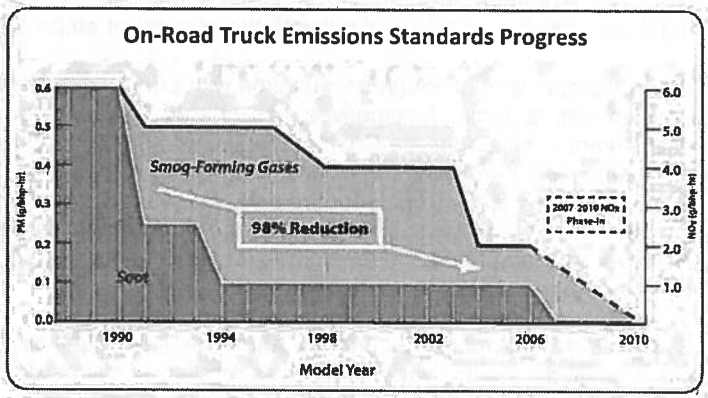
The CAA imposes requirements on transportation planners. It requires that federally-funded or approved highway, seaport, airport, and rail projects conform to SIP emission projections to avoid creating new air quality violations, worsening existing violations, or delaying timely attainment of air quality standards. Federally-funded transportation projects that may generate significant traffic volumes are also required to perform a "hot-spot analyses" of PM10 and PM2.5 emissions. EPA partners with other federal agencies to set conformity policy via regulations and to enforce that policy as infrastructure proposals are approved.

Under the NEPA statute, Federal agencies (as well as those that receive Federal funding), must conduct a review of all potential impacts to human health and the environment resulting from a major Federal action. The environmental review must evaluate the action's direct and cumulative environmental impacts. NEPA also outlines a public involvement process for local communities to ensure that the health impacts of goods movement projects are properly considered and mitigation efforts are implemented. To further improve community involvement, EPA developed the *Final Guidance for Incorporating Environmental Justice Concerns in EPA's NEPA Compliance Analyses* to educate Federal agencies on ways to address environmental justice concerns and involve local communities.[28]

State/Tribal. States also play an important role in regulating goods movement through numerous other state environmental and transportation planning mechanisms. These mechanisms include: emission standards for fuels, restrictions on truck idling, and limits on visible smoke from diesel equipment. For example, Massachusetts, like 14 other states, has a policy to limit truck idling. Multiple states have also established smoke limits for big diesel engines.

The State of California can adopt more stringent emission standards for new engines or vehicles (subject to a waiver from EPA) and set fuel specifications. Other states can choose to opt into California rules, impose operational restrictions, and establish their own requirements to accelerate the turnover of existing equipment to cleaner models. In some states, legislation may be required to enable these actions.

California has an extensive program to assess and cut the health risk from goods movement sources, as well as to reduce the emissions that contribute to high regional ozone and PM2.5 levels.[29] CARB adopted rules requiring that existing diesel trucks, harbor craft, and cargo equipment be upgraded or replaced on an accelerated schedule. CARB rules also require the use of low sulfur fuel for ships ahead of the IMO requirements and use of shore-based electrical power (or equivalent alternatives) to cut ship emissions at dock.



Source: U.S. Environmental Protection Agency, On-Highway Heavy Duty Diesel Emissions Reductions

Local. Local agencies, including ports and quasi-governmental organizations, can play a role in reducing emissions and health risk from freight facilities through their management of transportation corridors, and their zoning authorities affecting the location of freight infrastructure, and their use of landlord authorities to encourage or compel their tenants to transition to cleaner equipment and practices.

A number of ports have voluntarily implemented plans to manage air quality and reduce their environmental footprint. Ports have implemented a range of strategies, such as requiring shore power, increasing access to rail, and using low sulfur fuels among other strategies.
For example, the Ports of Los Angeles and Long Beach adopted a San Pedro Bay Ports Clean Air Action Plan[30] that calls for aggressive port action through leases, tariffs, and incentives to clean up diesel sources and limit the impacts of port expansion projects. The Port of New York and New Jersey has implemented a variety of clean air initiatives and has prepared a Harbor Air Management Plan.[31] Additionally, the Ports of Tacoma, Seattle, and Vancouver have developed the Northwest Ports Clean Air

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[28] U.S. EPA http://www.epa.gov/compliance/resources/policies/ej/ej_guidance_nepa_epa0498.pdf
[29] CARB. http://www.arb.ca.gov/html/gmpr.htm
[30] San Pedro Bay Ports Clean Air Action Plan. www.cleanairactionplan.org
[31] IAPH Tool Box for Port Clean Air Programs. www.iaphworldports.org/toolbox%201/casestudies.htm

Strategy, which outlines a series of short- and long-term commitments for all facets of port-related emissions (i.e., ocean-going vessels, trucks, cargo handling equipment, rail, and harbor vessels).[32]

2.6 Land Use Planning and Zoning

Land use planning involves decisions about how land is used, including whether something gets built or expanded in a community, where it is built, and what concerns are addressed in the process. Land use planning decisions are often made at the local, regional, or state level. In most cases, the Federal government has limited authority to set policy in this arena. However, federally-funded projects, such as interstate highways and railroads, must comply with all Federal regulations including the General Conformity Rule of the Clean Air Act and Executive Order 12898, *Federal Action to Address Environmental Justice in Minority and Low-Income Populations*. As the lead agency in monitoring compliance of these policies, EPA can work to integrate environmental justice considerations into the planning and decision-making processes in order to mitigate burdens on minority and low-income residents.

Zoning and land use decisions at the local level affect the location of freight terminals and port facilities. Local zoning, and, in a few cases, state laws, also determine how close residential neighborhoods can be built to these facilities or how close new facilities can be built to existing neighborhoods. The siting of homes near highways, rail yards near schools, and recreational facilities near seaports and airports, can result in increased localized exposure for residents and school children. Notification and the involvement of affected community residents in the land use planning process is critical to making decisions involving growth, development, transportation investments, and the future of a community.

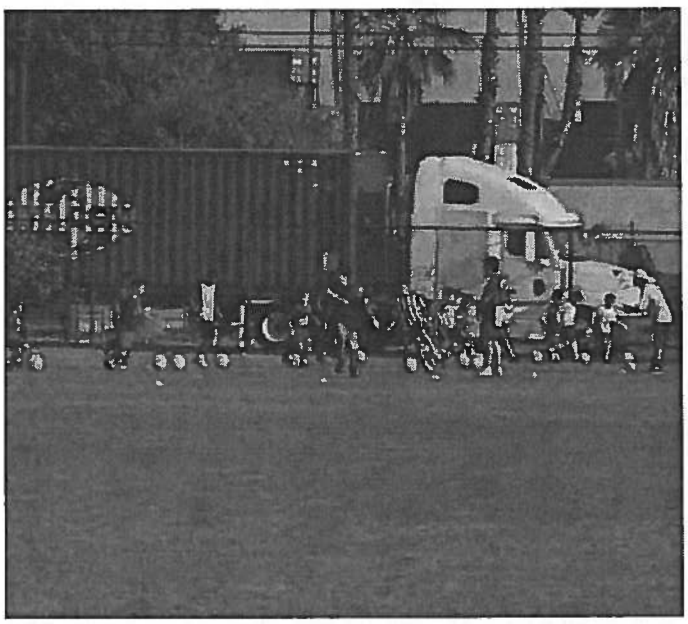

Photo by Caltrans

Increasingly, both residents and government officials recognize that a land use decision made in one local area can have impacts (positive or negative) on a broader geographical area, and that regional or system-wide impacts need to be considered when making such decisions. One example is the expansion of a marine port terminal that enables additional volume of containers imported from Asia. With that expansion, comes a need for more trucks and trains to transport the additional containers, coupled with a possible need for highway and rail yard expansion, and for larger warehouses to handle the influx of goods. Thus, a local decision made by a port authority near a city's harbor can have a regional effect in communities along transportation corridors, near rail yards, and in close proximity to distribution centers – even though these facilities may be nowhere near the port itself and may even be located in rural communities some hundreds of miles away. Conversely, not expanding the terminal might cause a different effect both in this and another region(s) since goods will continue to move from their origin to their destination by some form of goods transport, regardless of the expansion of an individual marine port terminal. Hence, it is critical to evaluate both localized and regional impacts prior to the initiation or expansion of goods movement related activities, to avoid and minimize the related health impacts and environmental justice concerns.

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[32] Northwest Ports Clean Air Strategy.
http://www.portseattle.org/downloads/community/environment/NWCleanAirStrat_200712.pdf

Children playing at elementary school with truck expressway in background *Photo by Andrea Hricko, USC*

The issues discussed above provide some background and context for a consideration of goods movement, air quality and public health, and environmental justice. The following sections in this report describe the recommendations of the NEJAC (based on the input from its Goods Movement Work Group) for further EPA actions to reduce the impacts of goods movement-related air pollution on environmental justice communities.

3. FINDINGS AND RECOMMENDATIONS

Consistent with the charge to the NEJAC from EPA, this section recommends ways in which EPA can work with its partners and stakeholders at the national, state, tribal, and local levels to reduce the risks to vulnerable communities exposed to goods movement emissions. The emission standards established by government agencies ensure that the diesel engines used to transport freight will ultimately be replaced with substantially cleaner models over the coming decades. The contribution of existing freight operations to elevated health risks in nearby neighborhoods and to high levels of regional air pollution, together with projected cargo growth over the longer-term, creates a need for additional actions now.

Recommendations for action in seven different focus areas are described below. These recommendations include both those things that EPA can directly influence, such as regulatory and enforcement mechanisms, as well as those arenas where EPA may play an indirect role, such as advocating with other agencies or encouraging voluntary implementation of cleaner technology and buffer zones. Within each area, the report describes the general principles and framework for taking action, followed by specific recommendations.

3.1 EFFECTIVE COMMUNITY ENGAGEMENT

The engagement of impacted communities may be initiated by residents and their representative organizations or by local, state, or Federal agencies involved in goods movement activities. Impacted community and tribal representatives seeking access to new or existing goods movements' activities can include different forms of "community facilitated strategies" or CFS. "Collaborative governance (CG)" is a complementary process that can effectively engage the community in collaborative decision making involving multiple stakeholders. CG typically is initiated by the executive branch of the government. CFS support robust empowerment and capacity building of the "community voice" necessary to reach across cultural, language, socio-economic, and technological barriers. CFS and CG should follow well-established moral and ethical principles that ensure transparency and accountability in dealing with prioritized goods movement activities.

There are two areas of consideration when addressing community driven engagement:

1. Improving traditional public participation mechanisms and procedures prescribed by law; and
2. Going beyond legal requirements using community driven mechanisms (such as a community facilitated strategy or a collaborative governance process) that incorporate the principles of environmental justice.

In addressing these two areas, it is important to identify and disseminate best practices that build upon EPA's previous work in effective public participation practices. Decision-makers and impacted communities can utilize various approaches and tools to ensure meaningful public participation that goes above and beyond the minimum legal requirements. Both approaches described below can advance these best practices and approaches.

3.1a. Community Facilitated Strategies. Involving the public, especially disadvantaged communities, in the decision making process is critical to achieving environmental justice for the communities and tribal territories likely to be impacted by proposed and existing goods movement related activities. This decision-making includes, but is not limited to, agreements, development of incentive programs, and other interactions and policy activities. Unfortunately, there are numerous examples in the goods movement sector where community involvement and meaningful public participation are lacking in the decision-making process. For example, while some port authorities webcast their harbor commission meetings (where decisions about new terminals or expanded operations are made), others do not post the meeting agendas online or have methods for making minutes publicly available. Some government transportation agencies have failed to consider impacted residents as stakeholders in the planning of highway expansions to accommodate increased goods movement activities until long after initial decisions were made. Anger and frustration has grown among residents who live near highways and transportation corridors when excluded from effectively participating in the funding, planning, and decision-making process.

Recognizing that every community and situation is different, an effective community-facilitated strategy would include at a minimum these elements at the local impacted areas[33]:

a. A community would determine through its own process the structure and form of a process to engage stakeholders in deciding on the best set of strategies to address impacts from existing or proposed goods movement facilities, infrastructure or activities.
b. The process would be convened by community or tribal leaders and assisted by legal, research, technical, and other groups that represent community and tribal interests.
c. Participants would be selected by the conveners. Potential participants would include community members, local businesses, government agencies, etc. Agencies which provide housing and related services for the homeless are also recognized as representative segments of impacted communities and tribal territories.
d. Participants would have access to independent technical and scientific expertise in order to understand impacts from facilities and activities, including cumulative and life cycle impacts.
e. All participants would have equal access to information and an equal voice at the table. Participants could request conveners to add parties necessary to achieve agreements on ways to address the identified impacts.
f. Participants would attempt to achieve those CFS agreements and if unable to do so, the community would choose among different legal, political, or other collaborative tools to move forward. A collaborative governance approach might be another way to move necessary parties though agreement processes and achieve acceptable outcomes.

As an example, a community-facilitated strategy includes the "Community Peoples' Table" (see figure 1) where all parties are actively and equally engaged in the decision-making process – each party has a representative voice and a seat at the proverbial table. In the context of goods movement issues, CFS would empower consensus building among all residents, including low-income and minority communities and Native Americans in indigenous territories. Impacted communities would continue to have access to remedies through the legal protection, privileges, and rights under Federal and related international/state/local policies, regulations, statutes, and treaties.

[33] Community Perspective: "The West End Revitalization Association (WERA)'s Right to Basic Amenities Movement: Voice and Language of Ownership and Management of Public Health Solutions in Mebane, North Carolina" ; by Omega R. Wilson, Natasha G. Bumpass, Omari M. Wilson, and Marilyn H. Snipes: Progress in Community Health Partnerships Journal Fall 2008 • Vol 2.3, Page 237-243 (The Johns Hopkins University Press (pchp.press.jhu.edu)

Community Facilitated Strategy Paradigm

Community Facilitated Strategy Paradigm designed by Omega Wilson and submitted to NEJAC's Goods Movement Workgroup May 18, 2009

Principles and Framework: Residents have a right to voice their opinions and exercise their rights when a decision is going to impact them or their community. The "Community Peoples' Table" represents steps for building credibility and trust, for impacted areas, in a goods movement process that should foster transparency and accountability in policy and decision-making. Robust collaborative partnerships with impacted residents can help enlighten the decision-making process with community-based knowledge. The goal is to capitalize on existing community and tribal resources by building positive and effective working relationships between decision-making agencies and those adversely impacted by goods movement activities.

Key principles guiding action in this area are:

- **Affected communities should be fully engaged at the local, regional, and national level, during the planning, development, and implementation stages of goods movement-related decisions.** Efforts to engage and inform the impacted areas should begin early and continue through completion of the project or initiative. EPA can play an active role in ensuring that impacted communities and tribal territories are involved throughout the process. It is critical that the communities determine for themselves the structure and form of its engagement with other stakeholders. One example of the use of a community facilitated strategy was developed by the West End Revitalization Association (WERA) and residents of Mebane, NC when they were excluded for 16 years from the planning process of 8-lane corridor for a 27-mile bypass/interstate through two historic African American communities. Local and state transportation agencies designed the project with Federal funding that now has input from impacted property owners.[34]
- **Funding must be provided to plan, strategize, and implement actions at the community and tribal levels to mitigate health and environmental impacts from goods movement.** Equity in funding and parity in the management of collaborative problem-solving initiatives at the community and tribal level will ensure short and long-term measurable outcomes and sustainability.

[34] Work-In-Progress & Lessons Learned: "Use of EPA Collaborative Problem-Solving Model to Obtain Environmental Justice in North Carolina"; by Sacoby Wilson, Omega Wilson, Christopher Heaney, John Cooper; Progress in Community Health Partnerships Journal Winter 2007 • Vol 1.4 Page 327-337 (The Johns Hopkins University Press (pchp.press.jhu.edu)

- **The "community voice" is recognized as valid and important to the resolution of goods movement issues that include air quality hazards as well as related water and soil risks.** Long-time community and tribal members can provide valuable information, such as the location of a tribal burial ground, past uses of sites, historic sites, and undocumented hazards that can positively influence goods movement planning and mitigation decisions.
- **Consideration of the cumulative and multiple impacts of all aspects of the goods movement supply chain (from mining of raw materials and manufacturing to landfill disposal and recycling) is an important part of the meaningful community involvement in resolving concerns about the impacts of goods movement activities.**

Recommendations: Based on the above mentioned principles, the following identifies specific recommendations for EPA action to directly effect, or influence, the needed changes.

1. EPA should promote decision-making processes that empower impacted community and tribal stakeholders through collaborative problem-solving approaches, that include:
   - Implementing a comprehensive outreach strategy by which to deploy the use of community facilitated strategies in communities where goods movement operations have been identified by EPA as high priority (*see complementary recommendation in section 3.3 – Regulatory and Enforcement Mechanisms*). Such a strategy must be transparent and accountable. It will also ensure that community stakeholders are included in advisory, planning, and decision-making,
   - Implementing new policies that support community-owned and -managed research data within impacted communities and tribal areas, and include social, economic, cultural, and community health factors.[35]
   - Evaluating and updating its EPA public participation approaches related to their effectiveness within communities affected by goods movement activities. A starting point would the updated recommendations put forth by the NEJAC in its Model Plan for Public Participation (1994).
   - EPA should encourage other federal agencies to adopt these recommendations.
   - Taking the lead in evaluating and validating the "community voice" and promoting a shift towards community-based approaches to capacity building, funding, and collaborative problem-solving.[36]
2. EPA should ensure that sustainable resources are available to increase the capacity of the community- and tribal-based organizations to participate in both traditional public participation processes and CFSs from within impacted communities and tribal territories. Community capacity includes the ability to document community-driven data collection, produce reports of results, and present evidence in informed manner, with the assistance of legal, research, and technical experts. Some examples include workshops and trainings for the CFS participants about related issues. These resources should be monitored to ensure the sustainability of funding equity and management parity for community and tribal based environmental justice organizations.
3. EPA should engage environmental justice areas and their locally based organizations to prioritize goods movement activities and related risks using the community facilitated strategy as a tool to address site-specific concerns. Human exposures, health effects and care as well as risks to impacted stakeholders' residential, business, and public properties should be among those priorities and concerns.

3.1b Collaborative Governance and Problem-Solving Strategies

Collaborative governance is a term that describes a shared decision making process involving representatives from the public, private and non-profit sectors, citizens, and others. These individuals

[35] Theory and Methods: "The West End Revitalization Association's Community-Owned and -Managed Research Model: Development, Implementation, and Action"; by Christopher D. Heaney, Sacoby Wilson, and Omega R. Wilson; Progress in Community Health Partnerships Journal Winter 2007 • Vol 1.4 Page 339-349 (The Johns Hopkins University Press (pchp.press.jhu.edu)

[36] "Built Environment Issues in Unserved and Underserved African-American Neighborhoods in North Carolina"; Sacoby M. Wilson, Christopher D. Heaney, John Cooper, and Omega Wilson; Environmental Justice Journal, Volume 1, Number 2, 2008, Page 63-72 (Mary Ann Liebert. Inc. Publisher)

may be able to contribute knowledge or resources, in developing effective, lasting solutions to public problems that go beyond what any sector could achieve on its own. It has been used to address many complex public issues and is well suited to address many environmental justice issues. Collaborative governance takes as its starting point the idea that working together creates more lasting, effective solutions. It is one of the tools that might be invoked by the participants in a CFS process to tap into additional means of financing desired investments or leveraging other resources.

In cases where a community facilitated strategy has been successfully implemented, all the needed participants will be at the table and will have agreed to take action, including official decisions, to support an agreed upon strategy. In other cases, for any number of reasons, not all the needed parties will have come to the table and further process will be needed to implement the solutions agreed to at the People's table. In these cases, and others where the impacted stakeholder community and tribal leaders believe they already possess sufficient capacity and resources to engage in collaborative decision-making, or where it is desired to bring additional resources to bear to implement one or more solutions, it may be suitable to invoke a collaborative governance process.

For those situations for which it is decided that a collaborative governance approach would be helpful, community leaders, together with other participants in their process, would first request an agency, foundation, civic organization, or public-private coalition, to act as a sponsor in providing funding and other support for a collaborative governance process. The community, with the sponsor, would engage an impartial organization to perform an assessment to determine the likelihood of success for the process by talking to all potential participants. If the assessment is favorable, the community and others who support the process would request a governor, legislator, local official, or respected civic leader to act as a convener -- with power to bring diverse people together in order to reach agreement on needed solutions and how they will be implemented. The convener could, if requested, appoint one of the leaders of the community facilitated strategy to become a co-convener of the process. The impartial organization would assist the conveners to identify all the appropriate participants and ensure skilled process management. At the end of the process, all the participants would enter into an agreement committing them to implement the agreed upon solutions.

An environmental justice use of a collaborative governance system was in the North Portland Diesel Emissions Reduction project, which was initiated at the request of a local environmental justice organization. The Governor of Oregon appointed a local convener who, with the assistance of the National Policy Consensus Center (a neutral organization), brought together government agencies and private and public trucking fleets, which all agreed to reduce diesel emissions through fuel and equipment upgrade projects. Financing for projects and actions agreed upon was shared by public and private entities to support the stakeholders' voluntary commitments. The West Oakland Environmental Indicators Project was co-convened by a community organization and EPA. They negotiated a joint partnering agreement, which was open to all stakeholders. Among the initial results were conversion of a number of heavy-duty trucks to compressed natural gas; and an emissions reduction program for the Port of Oakland for about 2,000 trucks.

A collaborative governance approach to goods movement-related issues would likely enhance both the chances of achieving agreed upon solutions and the outcomes sought by the community. Similarly, if a community develops a series of strategies requiring coordinated and complementary actions by a variety of public and private entities; a collaborative governance process convened by a governor, a mayor, an agency and community together, or another respected leader, has an excellent chance of achieving multiple enhanced outcomes. These might include infrastructure design that reduces air quality impacts, relocation of playgrounds or schools, supplemental pollution controls and health monitoring

While much of the experience with collaborative governance approaches has been at the community level, there is also a need for them at a more regional level. Many of the decisions that have the potential to create or ameliorate environmental justice issues have been and will be made at metropolitan, multi-county, tribal and state/county, multi-state levels. They include investments in transportation infrastructure, the siting of controversial developments like distribution centers, policies on alternative fuels availability and many others. While participants will include a different set of actors, the empowered representation from impacted communities is essential. There also is a need for robust and innovative stakeholder alliances, partnerships, and collaborative governance approaches to foster solutions to environmental concerns at a more regional level

Principles and Framework. Collaborative governance mechanisms may be appropriate in some circumstances to assist in implementing needed emissions reductions strategies for goods movement in communities with environmental justice issues. Key principles guiding action in this area are:

- During a collaborative governance process, all necessary groups, jurisdictions, and authorities, especially groups representing impacted communities, should have a meaningful part in making decisions at both the regional (multi-state, state, and multi-county/tribal) and at the community level (tribe, city, county, and neighborhood) on strategies and investments that will reduce air emissions associated with goods movement. To ensure the participation of groups from impacted communities, funding for their participation and for technical assistance needed to participate on an equitable basis should be assured early in the process, as would happen with a community facilitated strategy. To ensure the collaborative process is as objective and neutral as possible, community members must have a role in selection of the convener and the neutral process manager/facilitator.
- As part of collaborative governance processes, government participants should work together as an integrated group in order to promote an efficient process and resolve internal conflicts themselves.
- Collaborative governance processes should adhere to the principles of equity and inclusiveness; respect; transparency; effectiveness and efficiency; responsiveness; accountability; forum neutrality; and consensus-based decision-making. The goal is to reach agreements that might not be possible or as comprehensive using other means such as negotiation, mediation, settlements, or other forms of conflict resolution.
- Agreements reached through a collaborative governance process should aim to maximize beneficial outcomes and reduce costs across regulatory, technology, and other sectors. The goal will be to reach agreements on implementing integrated mitigation actions, including investments in infrastructure and decisions about land use, community benefits, local incentives, financing and funding mechanisms, job creation, and relocation.

Recommendations. Based on the principles described above, this section identifies specific recommendations for EPA action to directly effect, or influence, the needed changes:

4. EPA should support, encourage, and, where appropriate, co-fund collaborative governance processes relating to goods movement issues at both regional and community levels. Initially, EPA should co-fund several demonstration projects. EPA should seek commitments by federal and state agencies, regional organizations, municipalities, goods movement entities, foundations, and others to help fund these processes and the projects that are agreed upon. However funded or convened, these processes should assure that all appropriate participants should be included.
5. EPA should take the lead to get other Federal agencies to provide scientific and technical advice to these processes and to assist in implementing agreements. EPA should encourage all the participating Federal, state and local agencies to coordinate their authorities, technical assistance, and investments.
6. EPA should assist in identifying and supporting collaborative governance and consensus programs, private neutral facilitators, or equivalent experts to assist in process design, support to conveners, management, and facilitation. There is a network of mostly university-based centers that have experience both in traditional conflict resolution and in the emerging field of collaborative governance. These centers, as well as others that may be more conveniently located to the community, could serve as the neutral forum and provide process management and facilitation.

3.2 HEALTH RESEARCH DATA GAPS AND EDUCATION NEEDS

As noted in the Background section of this report, emissions from port, rail, trucking, and other goods movement activities have significant human health and environmental impacts in onshore communities. EPA has determined that diesel exhaust is "likely to be carcinogenic to humans by inhalation and that this hazard applies to environmental exposures." In addition, recent studies show that populations living near large diesel emission sources such as major roadways, rail yards, and ports are likely to experience greater diesel exhaust exposure levels than the overall U.S. population, exposing them to greater health risk[37].

Although there are research efforts to quantify goods movement-related emissions and resultant health effects, significant data gaps exist. Addressing these gaps would help to better elucidate community exposures and health effects. These could include air monitoring, development of emission inventories, exposure assessment studies, toxicologic and epidemiologic studies, health impact assessments (HIA), and health risk assessments (HRA).

SOME DIFFERENCES BETWEEN HEALTH RISK ASSESSMENTS AND HEALTH IMPACT ASSESSMENTS	
Health Risk Assessment (HRA) *	**Health Impact Assessment (HIA)**
Purpose: To quantify the health effects from a change in exposure to a particular hazard (*e.g. an air pollutant*).	**Purpose:** To make evidence based judgments on the health impacts of public and private decisions, and make recommendations to protect and promote health
Focus is primarily on one exposure-impact pathway (*e.g., an increase in diesel exposure leading to lung cancer*)	Takes a holistic approach to predict health outcomes of a variety of environmental and social impacts from a proposed project, program or policy; HIAs look at a range of exposures (including social exposures as well as environmental)
Predicts risk of health impact to a large population using estimations calculated from models	Can include qualitative (*e.g., surveys*) and quantitative (*e.g., modeling*) methods of analysis to evaluate potential health impacts
Does not directly measure pollutants (hazards) or exposures	Uses existing data and analysis when available, but primary data collection may be undertaken as needed
Does not include a plan for monitoring the impact of HRA or the proposed project on future health outcomes	HIA practice standards include monitoring as an important follow-up activity in the HIA process to track the outcomes of a decision and its implementation
May be included as part of an EIS, used as a tool for assessment in an HIA, or as a stand-alone assessment	May be included as part of an EIS, or as stand-alone assessment
	** as conducted in California for diesel cancer risks*

HRAs have been conducted at ports and rail yards in California, looking at both cancer and non-cancer health outcomes, such as cardiovascular and respiratory illnesses and premature death.[38, 39] That state's Air Resources Board (CARB) has characterized the near-source impacts of diesel exhaust emissions

[37] U.S. EPA Inspector General, *EPA Needs to Improve Its Efforts to Reduce Air Emissions at U.S. Ports, 09-P-0125,* March 23, 2009 http://www.epa.gov/oig/reports/2009/20090323-09-P-0125.pdf
[38] California Air Resources Board (CARB), *Health Risk Assessments and Mitigation Measures for 18 Rail yards.* See: http://www.arb.ca.gov/railyard/hra/hra.htm
[39] CARB, *Diesel Particulate Matter Exposure Assessment Study for the Ports of Los Angeles and Long Beach*, April 2006. ftp://ftp.arb.ca.gov/carbis/msprog/offroad/marinevess/documents/portstudy0406.pdf See also HRA results for West Oakland at http://www.arb.ca.gov/ch/communities/ra/westoakland/documents/factsheet112508.pdf

because it has a unit risk value for diesel exhaust's cancer effects. EPA has considered but chose not adopt a unit risk value for diesel exhaust cancer effects. This gap is critical because the current characterization strategies used by EPA are based on fine particle measurements, and they do not necessarily reflect the full exposures or health risks in these communities, due to limitations in monitoring and modeling and to the fact that fine particle measurements do not adequately reflect near-traffic exposures.

In addition, building awareness of the potential impacts of goods movement activities is crucial to addressing environmental injustices. Numerous activities can be used to educate residents, community-based groups, elected officials and others about the potential impacts of emissions from goods movement facilities and transportation corridors. These include:

- Educational conferences and workshops to share research findings on health effects, community concerns, and workable solutions. An example would be "Moving Forward: a conference on healthy solutions to the impacts of goods movement[40]" in 2007, with 550 attendees from 16 states and four countries, which provided an opportunity to share research results, community concerns, and solutions with a network of scientists, regulators and community groups.
- Fact sheets, videos, or reports about the impacts of goods movement activities (and successful mitigation measures) at a state or local level, written by government agencies, nonprofit groups, or university researchers. Examples include "A View from Our Window[41]" and "Paying with Our Health,[42]" both produced by community-based coalitions, a "Goods Movement 101" curriculum,[43] and several articles in *Environmental Health Perspectives*[44].

Principles and Framework. In many cases, residents living near goods movement facilities and along transportation corridors are disproportionately impacted by ship, rail, and truck emissions. To better understand the magnitude of emissions from goods movement facilities and the potential health impacts from exposure while addressing data gaps, additional monitoring, research studies, analyses, and information campaigns are warranted. Key principles guiding action in this area are:

- There is a need for more near source/localized air pollution monitoring stations because central site monitors do not adequately reflect the higher levels of exposure to mobile source pollution that communities face in close proximity to goods movement facilities. Fine particle measurements (PM2.5) do not fully reflect the levels of diesel exhaust emissions to which residents are exposed.
- There is a need for EPA to review the current research findings on diesel exposure and cancer and the current status of its methods to characterize diesel risk.
- There is a need for emissions inventories and air pollution monitoring to better understand the magnitude of emissions at major goods movement facilities, hubs, and corridors. Emissions inventories have been completed for only a small number of highway expansion projects, major ports and rail yards and none have been developed for large distribution center complexes. Only a few major ports [45] and one major rail yard in California have air monitoring programs with results publicly available and to our knowledge no other goods movement facilities have air monitoring programs with results publicly available.

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[40] See "Moving Forward Conference" at www.TheImpactProject.org
[41] See http://www.ccaej.org/docs/MAC/MAC_rev_12-8-05.pdf
[42] Pacific Institute. *Paying with Our Health: The Real Costs of Freight Transportation in California*. 2007. www.pacinst.org/reports/freight_transport/PayingWithOurHealth_Web.pdf
[43] See "Goods Movement 101" at http://www.TheImpactProject.org.
[44] Hricko, A. *Global Trade Comes Home: Community Impacts of Goods Movement*. Environmental Health Perspectives, February 2008. Available at http://www.ehponline.org/members/2008/116-2/spheres.html; Hricko, A. Guest editorial. *Ships, Trucks, and Trains: Effects of Goods Movement on Environmental Health*. April 2006. Available at http://www.ehponline.org/docs/2006/114-4/editorial.html
[45] See, for example, San Pedro Bay Ports (Port of Los Angeles and Port of Long Beach) Clean Air Action Plan, air monitoring program, http://caap.airsis.com/

- There is a need for additional scientific studies involving emissions from goods movement, including exposure assessment, toxicology, and cumulative impacts analysis, and health impact/risk studies. Although California has estimated diesel cancer risks and non-cancer health effects at 18 rail yards and a number of ports, no other state has conducted such studies. There is a need to build on existing occupational health studies with additional peer-reviewed studies of actual emission levels at, or health effects related to people living near ports, rail yards, or distribution centers.
- There is a lack of sufficient research funding across Federal agencies and research institutes to conduct studies of goods movement emissions and health impacts. Although EPA and the National Institute of Environmental Health Sciences (NIEHS) have partnered to fund Children's Environmental Health Centers, EPA and NIEHS do not have a similar partnership or special priority areas for funding research on the health impacts of goods movement. In addition, the U.S. Department of Transportation (DOT) does not have its own health research agenda in this area, nor a joint program with EPA and/or NIEHS.
- There is a lack of national attention and information/education about the issue of air pollution and health effects from goods movement facilities and freight/transportation corridors.

Recommendations. Based on the principles described above, this section identifies specific research and education recommendations for EPA to guide future action.

7. EPA should establish, for the port and rail sectors, a list of the largest ports and rail yards in the United States, and complete the analysis of demographics near port and rail facilities that was begun in conjunction with the 2007 Locomotive and Marine Engine Rule[46]. EPA should also undertake an assessment of the contribution from off-site transportation highways/corridors adjacent to those facilities (e.g., from trucks transporting goods from a port to a rail yard or distribution center). This will allow EPA to better understand the goods movement locations where significant environmental justice concerns may exist, even though community residents may not have raised concerns.

8. EPA should direct each Region to develop a plan to prioritize the most significant goods movement facilities of potential concern for emissions impacts within each region. The priority list should be based on emissions estimates from facilities and off-site transportation emissions, relative size of the facility, anticipated growth, proximity to disadvantaged communities, cumulative impacts, community concerns, and other relevant factors. Additionally, these priority lists should utilize information that already is available, such as emissions inventories, HRAs, action plans that have been developed to reduce emissions, air monitoring results, and scientific research results.

9. For those priority facilities, EPA should provide funding and technical guidance to state or local air agencies to conduct localized monitoring for toxic air pollutants in close proximity to the top priority goods movement hubs and corridors, with results available to the public.

10. EPA should conduct and/or fund additional research studies, including:

- Studies of exposure assessment, emission characteristics of both on-site and off-site sources, and source apportionment studies of emissions from goods movement facilities, including research on coarse, fine and ultrafine particles
- Toxicologic studies (e.g., animal and biomarker studies and assays);
- Epidemiologic studies of health effects of residents or school children in communities impacted by goods movement.
- Cumulative impacts studies

As guidance in facilitating research and studies, EPA should review the list of research gaps in the HEI Report[47] on the health effects of traffic-related air pollution. EPA should consider developing a three-way funding partnership with NIH (NIEHS) and DOT (FHWA, FRA, and FAA) to fund research

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[46] See Final Rule: Control of Emissions of Air Pollution from Locomotives and Marine Compression-Ignition Engines Less Than 30 Liters per Cylinder **(published May 6, 2008 and** republished June 30, 2008)

[47] See in particular, Section 5, part VIII.1 and Table 7.6 of the HEI Report, found at http://pubs.healtheffects.org/view.php?id=306

on exposure assessment, toxicologic, and epidemiologic studies related to exposure to emissions from the goods movement industry. The partnerships should include community-driven research and participation, including outreach and education.

11. EPA should revisit its health assessment of diesel exhaust emissions[48] as the Agency indicated it would do when it issued its assessment document in May 2002. Considering research that has occurred in the interim, and evaluating the need for further research, EPA should conduct a review of the current status of diesel risk characterization and the current scientific studies on diesel exhaust exposure and its links to cancer in order to determine if the Agency should reconsider adopting a unit risk value for diesel exhaust. In its scientific review, EPA should consider other health outcomes from exposure to diesel emissions, such as cardiovascular and respiratory illnesses.[49]
12. EPA should consider advocating that health impact assessments (HIA) or similar analytical assessments be conducted for major new or expanding goods movement facilities and transportation projects/corridors that are covered under NEPA. Some EPA Regional offices are already requesting that ports and freeway expansion projects conduct such HIAs, which are comprehensive health analyses of proposed infrastructure projects that evaluate air pollution, noise, impacts on access to parks, and other broad health-related issues.
13. EPA should develop a national communications plan to reach elected officials, urban planners, transportation officials and community members with information about the emissions from, and health impacts of, goods movement activities, using the same techniques the Agency has used in its SmartGrowth activities. Such a campaign should include fact sheets on each goods movement sector, in a number of languages, that summarizes concerns about emissions and health effects research findings. The information should be readily accessible on the EPA national and regional websites.
14. EPA should develop a special funding stream for environmental justice community grants focused on goods movement communities, to include community-based participatory research related to health impacts.

3.3 REGULATORY AND ENFORCEMENT MECHANISMS

There are numerous regulatory strategies to reduce freight emissions and exposure. These strategies include:

- Cleaner new engines and fuels for ships, harbor craft, locomotives, trucks, equipment, and aircraft;
- Fleet modernization to accelerate the replacement of existing diesel equipment with dramatically cleaner models, or to upgrade the existing equipment by: replacing the engine with a cleaner version ("repower") or installing additional verified pollution control devices ("retrofit");
- Shore-based electrical power for ships and harbor craft to eliminate engine operation while at dock.
- Operational limits on unnecessary idling for trucks, locomotives, and equipment;
- Low speed zones for ships to cut NO_x emissions that contribute to PM2.5 and ozone on-shore;
- Restrictions on visible smoke emissions from trucks, locomotives, or other sources; and
- Targeted enforcement actions for freight facilities in highly impacted communities.

In some cases, these strategies also have been successfully implemented or accelerated with a voluntary, collaborative basis through such means as enforceable agreements or incentives, etc. [*See section 3.7-Financing for additional discussion of these voluntary strategies*]

Principles and Framework. A regulatory approach historically has been the foundation to cut the impacts of freight movement on nearby communities, and to reduce regional pollution levels that can also affect environmental justice areas. Effective regulation of freight-related air pollution depends on action

48 See http://cfpub.epa.gov/ncea/cfm/recordisplay.cfm?deid=29060

49 See for example, a letter from Region 9 EPA to the Army Corps of Engineers concerning a Port of Long Beach marine terminal expansion project at http://www.epa.gov/region09/nepa/letters/Port-Long-Beach-Middle-Harbor-Redev-Proj.pdf

by each entity with relevant authority, including international bodies, federal agencies, tribes, states, and local agencies (including seaports and airports).

EPA must play multiple roles -- as a direct regulator and enforcer of federal requirements; as an advocate with other federal agencies about transportation policy, including mitigation and funding; as a strong supporter of aggressive international treaties; and as a facilitator of state and local initiatives that go beyond federal requirements. EPA and other government entities are engaging in each of these areas, but there are still impediments to the fast-paced progress needed to address the environmental justice concerns. Key principles guiding action are:

- There is a need for more urgency in national actions to cut freight pollution to speed attainment of air quality standards by the applicable deadlines and to reduce the exposure and health risk from freight emissions in communities that already attain those standards.
- The pace of fleet modernization must be accelerated through a combination of regulatory and incentive mechanisms.
- More vigorous, focused enforcement should be used to improve air quality in communities affected by goods movement facilities.
- Quantitative goals and policies are needed to cut criteria and toxic pollutants from existing, expanding, and new goods movement facilities.

Recommendations. EPA leadership should elevate the issue of environmental justice related to goods movement activities to initiate additional regulatory and enforcement strategies within the Agency, as well as to facilitate action by other Federal, state, tribal, and local agencies.

15. <u>EPA should ensure effective, early control requirements on international ships and aircraft.</u> On the marine side, EPA should work with neighboring countries to achieve IMO approval of a North American Emission Control Area (ECA) to accelerate deployment of new IMO standards for cleaner ships and fuels. EPA should work with FAA to introduce stringent proposals to the International Civil Aviation Organization for aircraft engines with lower NO_x and PM emissions, as well as cleaner jet fuels. Concurrently, EPA should publicly evaluate the potential benefits, costs, and impacts of pursuing new national regulations requiring advanced control technology and cleaner fuels for both U.S. and foreign-flagged ships operating in U.S. waters, and aircraft serving U.S. airports.

16. <u>Significantly accelerate modernization of the existing diesel fleet used to transport freight.</u> EPA should fully use its programmatic authorities to achieve additional, earlier reductions from existing goods movement sources. EPA should also encourage its federal partners to support these efforts through incentives and other mechanisms. EPA's actions should include, but not be limited to:
Requiring or updating engine rebuild standards for all existing engines under its authority;
Using all available means to encourage engine and equipment manufacturers to accelerate the development and production of the cleanest engines in advance of regulatory deadlines sources; and
Evaluating and assessing operational opportunities to reduce in-use emissions, such as adopting a national, time-limited idling standard for all engines under its jurisdiction. (*See Financing section for complementary incentives element*)

17. <u>EPA should facilitate state and local initiatives that go beyond Federal requirements to cut community and regional pollution.</u> EPA's role should include:
- Providing technical assistance to states that want to adopt and enforce in-use emission standards to accelerate fleet modernization, as allowed by federal and state law.
- Issuing timely waivers for stricter California vehicle and fuel emission standards to benefit all states wishing to "opt-in" to those standards.
- Supporting expansion of state/local operational restrictions, including but not limited to idling limits and designated truck routes, with information about successful programs that could serve as models.
- Using Federal leverage (via project approval authority and funding capability) to aid state/local efforts on legal agreements with industry to accelerate progress (early availability of cleaner engines depends on recommendation 16 above).

18. Establish quantitative goals to reduce emissions and exposure from existing, major freight facilities and plans to achieve those goals. EPA, in consultation with states and communities, should identify sites of concern and establish priorities among them. EPA should employ available planning mechanisms to set such goals, either by identifying national targets or assisting local or state efforts. EPA and other Federal agencies should encourage ports, marine terminal operators, railroads, airports, and transportation agencies, etc., to develop freight facility air quality plans in a public process with: quantitative reduction goals; commitments for action to achieve those goals based on voluntary initiatives with public agency involvement, enforceable agreements, the facility's legal authorities, and/or incentives; and periodic public reporting on progress. With this mechanism, EPA and partner agencies can offer assurances to environmental justice communities regarding the magnitude and pace of emission reductions from high priority freight facilities. In nonattainment areas, EPA should back these goals with enforceable SIP commitments for future federal actions to reduce emissions from goods movement sources for timely attainment.
19. Mitigate localized air impacts from expanding existing freight facilities or siting new ones. If full mitigation is not feasible, EPA should establish policies and guidance to assure that new and expanded infrastructure and/or facility projects will achieve the highest technically feasible air levels and be mitigated to the extent acceptable to impacted neighborhoods. As part of the guidance, EPA should outline a process based on the principles and recommendations in Section 3.1 (Effective Community Engagement) of this report. To accomplish this, EPA should work with DOT agencies to require more effective general and transportation conformity programs to ensure that affected projects cannot simply use the expected reductions from other sectors to subsidize growth in operations. In communities already impacted by high pollution levels from freight facilities, expansion and new facilities should not be considered unless the project and its mitigation measures can be designed to at least "do no harm" to the localized area, as well as the region.
20. Expand enforcement. EPA should increase its enforcement efforts, in coordination with state/local authorities, by deploying more field inspection teams to focus on sources operating at goods movement facilities and within nearby communities. EPA should also target violation penalties to help fund fleet modernization by directing enforcement fines toward diesel clean up projects in environmental justice areas.
21. EPA should vigorously implement and enforce on-time implementation of all current mobile fleet clean fuel and emission reduction regulations.

3.4 LAND USE PLANNING AND ENVIRONMENTAL REVIEW

Improvements in land use planning are an important component of any overall strategy to prevent or mitigate the air emission and community impacts related to goods movement facilities. Consideration of existing sensitive receptor locations (such as schools, homes, hospitals, nursing homes, daycare centers) should be considered whenever siting new (or expanding existing) goods movement facilities. Similarly, the presence of existing goods movement facilities (ports, rail yards, truck traffic corridors, distribution centers) should be considered when siting facilities for sensitive receptors.

Through the transportation conformity process (in which a state SIP conforms to a State Transportation Plan), EPA has influence over air quality when new transportation corridors and/or federally-funded freight facilities are constructed or expanded. Also, states with non-attainment areas have to submit to US EPA a wide array of control measures considered in the development of State Implementation Plans (SIP). In a SIP, a land use measure might be a policy or program that changes the urban form in a way that leads to fewer vehicle emissions.

Principles and Framework. The construction or expansion of goods movement facilities, infrastructure, and transportation corridors has potential impacts on air quality, land use, and environmental justice. A key aspect of land use planning in goods movement communities involves providing zones of separation or buffers between new residential or school developments and port/freight facilities or between new or expanding freight hubs and existing communities and schools. After considering evidence regarding the health risks of air pollution (including diesel exhaust and other emissions), establishing zoning designations and other land use planning actions can help to ensure that new facilities and transportation corridors are constructed in a manner that minimizes future risks to surrounding communities and prevents siting of conflicting uses. Such actions will help ensure that sensitive receptors are located at a safe distance from goods movement transportation and infrastructure.

Because of the array of different actors involved in land use planning, there are numerous policy levers that EPA can use to achieve environmental justice goals. There are a number of key principles guiding action in this area:

- **Scientific studies show that adverse health impacts can be minimized with increased distance between sources of air pollution and sensitive receptors, with most studies showing that respiratory health effects (e.g., exacerbation of asthma) are more likely to occur within 300-500 meters of traffic-related air pollution.** These research findings should be used in developing land use guidelines. The Health Effects Institute (HEI) Report says: "In light of the large number of people residing within 300 to 500 meters from major roads *[that is, near traffic-related pollution]*, we conclude that the evidence for these *[adverse]* health outcomes indicates that the exposures are likely to be of public health concern and deserve public attention. *Italics added.* "Traffic-related pollution" results from trucks traveling on highways going to rail yards, ports and distribution centers and operating at those facilities, as well as diesel and other equipment operating at those goods movement facilities.
- **Land use decisions are among the most controversial urban planning issues for community residents, and early community involvement is critical to high quality environmental health decisions.** Improved public involvement can ensure that community concerns are addressed and that grass roots solutions to environmental problems are considered. Improved public involvement and collaborative approaches can ensure that community needs, economic development, and other concerns are addressed; grassroots solutions to environmental problems are considered; and multi-jurisdictional planning is encouraged.
- **EPA has the authority to issue guidelines and community fact sheets for consideration by states and communities in making land use decisions that the Agency believes will reduce pollution.**[50] For example, EPA has used such authority in its Smart Growth recommendations. In certain circumstances, EPA has the authority to address issues associated with the siting of goods movement facilities.

Recommendations. Based on the principles described above, this section identifies specific recommendations for EPA action to directly effect or encourage the needed changes.

22. **EPA should ensure that its staff is familiar with, conversant about, and engaged on local and regional goods movement issues.** Specific steps should include conducting site visits of selected goods movement environmental justice communities to view land uses where significant emissions sources are located near sensitive receptors, so that EPA is as familiar with the goods movement issue as it is with TRI emitters and Superfund sites. By meeting with community leaders and residents, as well as with state and local air pollution regulators, goods movement industry representatives and authorities (port, rail and trucking industry, and distribution center developers), and scientific experts on the health impacts of air pollution, EPA will have a solid basis for moving forward on several fronts. Also, EPA will have established a basis that includes guidance for addressing the relationship between land use and air quality to protect public health and inform future land use with consideration of cumulative impacts.
23. **EPA should develop national guidance for addressing land use decisions and air quality with regard to separating sensitive receptors from mobile source air pollution generated by goods movement facilities, including highways, ports, rail yards, and distribution/transload centers.** For this guidance, EPA could use as background the work done by the HEI reviewing research findings and guidance on suggested buffers developed by the California Air Resources Board (CARB), while recognizing that each goods movement facility has different operational dynamics, and the location and population density of nearby residents can vary widely. EPA already has a document[51] on land use activities and air quality, but it does not mention goods movement nor the

[50] See for example, http://www.epa.gov/livability/pdf/whtissg4v2.pdf
[51] See http://www.epa.gov/oms/stateresources/policy/transp/landuse/r01001.pdf, published January 2001

scientific studies about health effects in close proximity to traffic-related pollution, so it needs updating. As a reference, CARB has recommended not siting "new sensitive land uses such as homes, schools, daycare centers, playgrounds or medical facilities near goods movement facilities." Its recommendations included avoiding the "siting of sensitive land uses within 500 feet of a freeway; 1000 feet of a distribution center or a service/maintenance rail yard; and immediately downwind of ports in the most heavily impacted areas." In addition, for "facilities within one mile of a rail yard," CARB recommended that consideration be given to "possible siting limitations and mitigation approaches.[52]" This guidance should include some consideration of site-specific factors and be widely disseminated to the transportation and logistics industry, planning officials, school administrators and boards, real estate developers and others.

24. <u>EPA should develop and publicize a "best practices" clearinghouse, describing successful methods of reducing diesel emissions in each goods movement sector as well as successful methods of engaging communities in that process, including copies of NEPA letters that EPA has developed on goods movement issues.</u> With such information readily accessible, community residents, industry, port and transportation officials will not have to "start from scratch" in researching successful mitigation measures and alternative technologies that they might want to consider when considering land uses.
25. <u>EPA should make publicly available staff comments on NEPA environmental reviews for port, rail or highway facilities publicly available</u> and part of the Goods Movement Clearinghouse as referenced in recommendation 24. EPA should post such comments on each Region's website, with a link to these comments from the Region's EJ page. In this regard, EPA should also consider whether a review or possible update of EPA's 11-year old *Final Guidance for Incorporating Environmental Justice Concerns in EPA's NEPA Compliance Analyses* is needed to address concerns about environmental justice from mobile source air pollution at goods movement facilities.
26. <u>EPA should continue to work with the DOT to update its FHWA guidance to state DOT agencies about methods for quantitatively analyzing mobile source air toxics (MSAT) for new/expanding transportation infrastructure projects, as well as with other DOT agencies (FRA, FAA) for similar guidance on new/expanding rail facilities and airports), including the need to consider the body of data showing health effects in close proximity to traffic-related pollution</u>. This strategy should include developing educational materials on other health-related topics to help the public understand how transportation and land use decisions relate to near roadway health impacts, quality of life issues, and physical activity limitations. Providing this information will make the public better equipped to provide meaningful input during the public participation process.
27. <u>EPA should conduct an analysis of its legal authorities to influence land use decisions on the siting of new or expanded goods movement activities and facilities, including highways..</u>

3.5 TECHNOLOGY

<u>Principles and Framework</u>

- Currently available emission reduction technologies can provide immediate air quality benefits at goods movement facilities. These technologies include energy conversion technologies, fuels, and after-treatment devices.
- Regulatory measures mandating cleaner technologies as new equipment enters mobile fleets do not support the pace of change that impacted communities expect for cleaner air. Non-traditional technological approaches can further reduce goods movement related emissions. These approaches include use of emissions capture technologies, renewable energy sources, expanded electrification, and hybridization.
- Technologies are available to improve goods movement facility air quality extend beyond mobile equipment to infrastructure and systems that improve facility efficiency and throughput. These approaches include the use of radio-frequency identification devices and GPS-based automation and optimization of product movement, automated vehicle processing, and other systems that improve

[52] California Air Resources Board. *Air Quality and Land Use Handbook: A Community Health Perspective. May 2005.* Available at: http://www.arb.ca.gov/ch/handbook.pdf

overall system efficiency. Such technology can provide a robust data source to achieve the goal of transparency and meaningful public involvement
- EPA attention to environmental justice goods movement issues provides an opportunity for the Agency to support development of world-leading technological innovation that can provide further emission improvement opportunities.

Please see EPA's Clean Air Act Advisory Committee Clean Diesel Report,[53] EPA's Ports Strategy[54], the California Air Resources Board Draft Report – *Technical Options to Achieve Additional Emission and Risk Reductions from California Locomotives and Rail yards*,[55] various industry documents, and other references that detail the wide range of technologies available to improve air quality in and around goods movement facilities.

Recommendations. Based on the principles described above, this section identifies specific recommendations for EPA action to directly effect, or influence, the needed changes.

28. EPA should expand the amount of credit allowed in SIPs that drive states to offer economic and other incentives to reduce existing equipment emissions through accelerated deployment of cleaner technologies. Such programs must include enforceable provisions that provide certainty to impacted communities that those emissions benefits will be achieved. This guidance should encourage the development of programs which offer sufficient incentives that encourage equipment owners to pick up a substantial portion of costs in order to extend the life of an existing piece of equipment with lower emitting technologies. This guidance also should encourage the adoption of technologies and methodologies expediting vehicle, container, and other product movement through goods movement facilities.

29. EPA should establish, within a national clearinghouse, information about goods movement emissions reduction technologies, techniques, and best practices. EPA's guidance development for best practice mitigations should be incorporated into all new goods movement facility and corridor projects. These practices should help land use planners, infrastructure developers, and others identify the cleanest available technologies appropriate to the specific nature of a given goods movement development. EPA should make such a clearinghouse available to affected communities to inform and empower local communities to address projects under review for mitigation.

30. EPA should use its own research and development resources, as well as partner with other federal partners and other stakeholders, to develop and accelerate the commercialization of innovative technologies that will benefit communities impacted by goods movement activities.

3.6 ENVIRONMENTAL PERFORMANCE, PLANNING, AND MANAGEMENT

Environmental management and planning tools relevant to measuring and reducing environmental justice impacts of goods movement include environmental management systems (EMS), clean air action plans, emissions inventories, facility air monitoring, emissions reduction agreements such as SmartWay, and performance standards for operations.

EPA has various programs underway which are focused on improving the environmental performance of public and private organizations involved in goods movement through non-regulatory initiatives. Some of these are specific to the goods movement industry, such as the SmartWay Transport Partnership, while others are more general but include affected activities in the goods movement sector, such as the Clean Diesel Campaign and the Sector Strategies Program activities with ports.

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[53] See http://www.epa.gov/air/caaac/pdfs/2007_01_diesel_rec.pdf
[54] See http://www.epa.gov.ispd/ports/#ports
[55] See http://www.arb.ca.gov/railyard/ted/122208ted.pdf

EPA has taken a leadership role in its Sector Strategies program to encourage development of EMS in certain aspects of the goods movement system, particularly ports, through the development of training materials and assistance in funding of training programs. In certain goods movement industry sectors, EPA has encouraged the adoption of environmental management tools that address specific environmental aspects of goods movement without adopting a full EMS. For example, EPA' s SmartWay program has taken a leadership role in providing a Freight Logistics Environmental and Energy Tracking (FLEET) Model to shippers, truck operators, and rail carriers to assess their corporate emissions footprints. Additionally, the organizations use the FLEET model to project the amounts of reductions that are possible with different technology and implementation options; allowing operators to customize their reduction strategy.

Principles and Framework. Goods movement activities in any particular location involve many public and private organizations, while most existing environmental planning and management systems (i.e., EMS, and voluntary industry partnerships) only affect individual organizations or sectors. The holistic assessment and coordinated reduction of environmental justice impacts from the larger goods movement sector is rare – due to the involvement of many public and private organizations in any given location and the lack of an obvious "home" or regulatory driver. Perhaps the best examples of holistic plans are the clean air plans that are being applied in certain port areas (i.e., the Los Angeles-Long Beach and the Seattle/Tacoma/ Vancouver BC ports); however, even these ambitious plans are limited to goods movement impacts directly associated with ports and not the ancillary infrastructure supporting the ports. Therefore, the plans are not comprehensive.

Key principles guiding action in this area are:

- **EMSs are an established way of improving environmental performance beyond regulatory compliance.** Numerous public and private organizations have found that EMS provides a structure that makes business sense as well as reduces environmental impacts. EMSs require senior management support and involvement, including approval of the environmental aspects and impacts of the organization and periodic review of progress and results (typically at least twice per year).
- **Environmental justice issues can be readily incorporated in EMS planning efforts as an aspect of an organization's activities.** Identifying environmental justice as an "aspect" of an organization's activities in an EMS would require the organization to go through the process, develop required plans, establish specific objectives and targets, implement the plan, and monitor and track the results then set new targets to further minimize or eliminate the impact (i.e. continuous improvement). In other cases companies or institutions may have departments dedicated to community outreach and response, or make other allocations of responsibility within the organization, and those staff would be best positioned to develop goals to address environmental justice—and should be encouraged to do so. These staff should be encouraged to look to EMS principles in terms of methodical review, goal setting, and tracking.
- **Management tools for improving environmental performance have not been applied consistently in goods movement.** Rather, they have been applied to greater and lesser degrees in certain industry sectors.
- **EMS use in the private sector is a useful tool to improve environmental performance but is generally used only internally due to integration of business confidential information.** This limits the ability to integrate EMS between public and private sector participants in goods movement.

Recommendations. Based on the principles described above, this section identifies specific recommendations for EPA action to directly effect, or influence, the needed changes.

Environmental Management Systems (EMS)

An EMS is a management system that allows an organization to systematically manage its environmental impacts by incorporating environmental considerations and decision-making into an organization's daily operations and long-term planning. An EMS is a continual cycle of planning, implementing, reviewing, and improving the processes and actions that an organization undertakes to meet its business and environmental goals.

31. EPA should, through its SmartWay and other programs, encourage shippers, trucking firms, and railroad companies to use corporate modeling and management tools like the FLEET model and EMSs to measure their environmental footprints. EPA should continue to develop additional tools and models and encourage the use of EMSs for other segments of the goods movement system, including ocean-going carriers, air carriers, major developers of distribution centers, state transportation departments, and municipal planning organizations. EPA's involvement in training can help encourage both the development of EMS for general environmental improvement as well as specific guidance on including environmental justice concerns in the EMS planning process. Through the trainings, EPA should encourage public participation in public entity EMS planning (both initially and as part of the periodic review process where results are publicly reported and the plan modified as needed) and encourage integration of relevant portions of private sector EMS or other tools where the private sector entities are willing to do so.
32. EPA should provide technical assistance funding to review environmental management practices of organizations involved in goods movement in geographic areas with environmental justice concerns. Coordinated reviews could help identify potential synergies or conflicts between various management approaches, which could serve as part of the "check" process of continuous environmental improvement.
33. EPA should develop and provide educational material, programs, and funding to organizations which could help develop a more comprehensive approach to emission reductions due to their areas of authority. In particular, municipal and regional planning organizations and transportation departments have relevant responsibilities but may lack training and awareness of environmental justice impacts of goods movement facilities. This effort should include both information targeted at senior management and elected officials as well as expansion of the technical guidance that EPA has developed relevant to assessment and reduction of environmental justice impacts of certain goods movement industry sectors so that it is relevant to more goods movement industries and participants.
34. EPA should encourage the funding of pilot projects, which utilize a holistic approach and the reduction of environmental justice impacts from goods movement in specific geographic areas. EPA's involvement in this effort should also encourage public participation in EMS planning (both initially and as part of the periodic review process where results are publicly reported and the plan modified as needed). EPA should allow funding of these kinds of holistic environmental justice impact reduction plans for goods movement as Supplemental Environmental Projects for settlement of enforcement actions. Where EPA funding is not available, EPA should encourage other Federal, State, and local governments as well as private entities to fund such projects.

3.7. RESOURCES, INCENTIVES, AND FINANCING

Principles and Framework. Funding and financing tools exist at the federal, state, and local levels that target solutions to improve air quality in environmental justice communities. Solutions cannot be solely provided by government resources. Timely and comprehensive solutions must include both government and private resources. However, the existing funding and financing tools have not been fully used or lack the ability to leverage private resources to alleviate air quality problems in these communities. With budget constraints at all levels of government, focus should be placed on directing existing funding and financing tools toward communities with high pollution levels and environmental justice issues. Existing tools include a variety of cleanup programs at EPA Community Development Block Grants and a variety of state and federal tax credit programs, including the New Markets Tax Credit Program administered by the U.S. Treasury Department's Community Development Financial Institutions Fund (CDFI Fund) and targeted toward business and projects located in low-income communities

Key principles guiding action in this area are:

- **Current resources available to mitigate the impacts of diesel emissions from goods movement are insufficient to ensure environmental justice.**
- **There are insufficient mandatory allocations of Federal transportation and infrastructure funds for cost-effective air quality projects**. Increases to such allocations could be used to address mitigation options that would improve air quality in the community.

- **Proposed projects, including goods movement expansions, do not accurately account for environmental impact-related costs.** Internalization of all environmental mitigation costs, as well as other project costs, must be included in the final project budget.
- **New sources of funding and new financing programs are needed to mitigate goods movement air emissions in environmental justice communities.** Funding and financing tools could include: fees (local, state, or Federal), surcharges, tax credits, tax-exempt bonds, and loan guarantees.
- **Supplemental resources needed to reduce emissions to a desired level, beyond those provided by** Federal and state programs, **should be financed by regional and local tools that are agreed upon by all stakeholders in an open collaborative process, such as the community facilitated strategy and collaborative governance approaches described in 3.1.** Several existing financing tools could successfully be applied to address air quality issues in environmental justice communities.
- **Incentives to encourage actions by private entities involved in goods movement that go beyond regulatory minimums should be provided to assist in meeting additional costs for reducing exposure and risk to impacted communities.**

Recommendations. Based on the principles described above, the following identifies specific recommendations for EPA action to directly effect, or influence, the needed changes.

35. **EPA, in partnership with other federal agencies, should propose increased funding for programs that encourage the accelerated development and deployment of lower emitting technologies and effective mitigation strategies into the goods movement sector.** EPA should prioritize use of National Clean Diesel Campaign funding to improve the air quality within goods movement impacted communities by promoting the deployment of cleaner technology using certified and verified technologies. EPA should provide factual information about the national cost to modernize the entire goods movement fleet, the health and economic benefits of accelerating that modernization, and the possible mechanisms to help incentivize that effort
36. **EPA should seek full funding for the *Diesel Emission Reduction Act* of 2005[56] at the full authorized level, with monies directed to areas with high health impacts from goods movement activities.** EPA, in its prioritization of grant awards, should ensure that these funds and the allocation formula used for these funds is based on reducing risk in environmental justice communities impacted by goods movement activities. EPA should work with Congress, DOT, and other federal agencies related to goods movement activities, to ensure that any new fees considered for cargo or freight infrastructure include funding to reduce emissions and health risk.
37. **EPA should seek joint innovative financing strategies with other Federal agencies, non-profit organizations, and private industries.** These financing strategies should encourage public-private partnerships that provide flexible financing options as well as informational outreach and technical assistance. Key stakeholders to include in such partnerships are: other Federal agencies; state and local governments/agencies; business and finance partners, including non-profit lenders; and community environmental justice and other organizations
38. **EPA should seek to create incentives for facilities and participants in potential public-private partnerships**. Incentives should be both financial- and compliance-based and include community involvement in determining where funds are to be used for mitigation in these communities. Banks should be encouraged to provide loans that target and alleviate the negative impact of goods movement. Banks should receive Community Reinvestment Act credit for the transactions.
39. **EPA, in partnership with other federal agencies, should encourage the funding of projects to clean up the legacy diesel fleet and mitigate impacts on communities.** Such incentives include but are not limited to:
    - Publicize emissions mitigation from goods movement as a qualifying Supplemental Environmental Project (SEP) if proposed by regulated sources to settle environmental violations near environmental justice communities;

[56] See Energy Policy Act of 2005 (Pub.L. 109-58)

- Leverage DOT Congestion Mitigation and Air Quality funding for cost-effective air quality projects that directly reduce emissions from diesel vehicles and equipment, and push for set asides from other Federal funding for infrastructure;

40. EPA, having already endorsed the recommendations of the Environmental Financial Advisory Board (EFAB) report to establish State Air Quality Finance Authorities that would assist owners of small fleets of diesels and of small goods movement related businesses to receive low cost financing, should work with States and Congress to implement these recommendations.

- EPA and DOT should agree to set aside a significant portion of DOTs allocation of Private Activity Bond authority for projects related to goods movement emissions mitigation.

41. EPA should support access to financing programs (such as loans or loan guarantees) for entities that may have to comply with future federal or state emissions regulations.

APPENDICES

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APPENDIX A

NATIONAL ENVIRONMENTAL JUSTICE ADVISORY COUNCIL

Charge for Developing Recommendations to Address the Air Quality Impacts of Goods Movement on Communities

ISSUE

Environmental pollution from the movement of freight is becoming a major public health concern at the national, regional and community levels. Also known as "goods movement," the distribution of freight involves an entire system of transportation facilities, including seaports, airports, railways, truck lanes, logistics centers, and border crossings. The distribution of goods involves diesel-powered vehicles and equipment almost every step of the way, resulting in significant emissions of particulate matter (PM), nitrogen oxides (NOx), hydrocarbons, and other air toxics throughout the process. A substantial body of scientific evidence asserts these emissions are or could be linked to respiratory disorders, cancer, heart disease, and premature death. EPA's *Health Assessment Document for Diesel Engines* (EPA, May 2002) and its *Regulatory Impact Analysis for Heavy Duty Engine and Vehicle Standards and Highway Diesel Fuel Sulfur Control Requirements* (EPA December, 2000) define agency public health concerns surrounding existing diesel engine emissions. In addition, community concerns include traffic congestion, noise, pedestrian safety, and overall community aesthetics and land use considerations.

The environmental, public health, and quality-of-life impacts of goods movement on communities are more pronounced in areas with major transportation hubs and heavily trafficked roads. "Near roadway hot-spots" – localized areas with elevated levels of air pollution – is an issue of long-standing concern to EPA and other environmental health agencies. This issue also is a matter of increasing concern to government transportation and planning agencies. Research shows that the many communities, including minority and/or low-income communities, living near these transportation hubs and thoroughfares, already bear disproportionate environmental impacts because of their close proximity to multiple pollution sources.

Recent and projected increases in foreign trade require significant improvements to the essential infrastructure needed to move freight from coastal ports to the rest of the country. For example, the American Association of Port Authorities estimates that the amount of cargo handled by American seaports, currently about 2 billion tons a year, will double in the next 15 years. In most cases, seaports are just the first stop. It has been argued that if the continued investment in goods movement infrastructure does not simultaneously address the serious environmental and/or public health concerns associated with goods movement, the already high levels of air pollution and their associated health effects will increase and further harm public health and quality-of-life. It is becoming increasingly important that these entities operate sustainably, i.e., economically viable, environmentally and socially responsible, safe, and secure.

In accordance with Administrator Johnson's memorandum, "Reaffirming the U.S. Environmental Protection Agency's Commitment to Environmental Justice" (November 4, 2005), EPA maintains an ongoing commitment to ensure environmental justice for all people, regardless of race, color, national origin, or income. In years past, EPA has made substantial efforts to address environmental justice concerns related to air pollution issues. The National Clean Diesel Campaign, utilizing strategies such as diesel retrofits and anti-idling technologies, and the Community Action for a Renewed Environment (CARE) initiative, are but two programs that EPA's Office of Air and Radiation (OAR) has developed to respond to the environmental justice issues associated with air pollution concerns. EPA has strategically focused its clean diesel efforts on five key sectors: school buses, ports, construction, freight, and agriculture. These sectors represent the diverse array of diesel engines in use today and provide the best opportunities for EPA to obtain emissions reductions from existing engines that can significantly protect public health. EPA also has developed several innovative financial models that have the potential to upgrade many of the trucks and other diesel equipment that move our nation's goods, if low cost financing can be obtained. Other OAR programs like the SmartWay Transport Partnerships and Agency programs like OPEI's Sector Strategies Program for Ports, also have contributed to addressing the environmental health impacts of goods movement on communities, including minority and/or low-income communities.

As an important first step, EPA also has been encouraging ports to do emission inventories, as this provides a baseline from which to create and implement emission mitigation strategies and track performance over time. This can be accomplished within the framework of a company's Environmental Management System (EMS), which also fosters a company culture of environmental stewardship. In addition, EPA is addressing emissions from new engines. The new standards for highway diesel engines are expected to reduce the emissions of individual diesel vehicles dramatically, with stringent PM and NOx emission standards beginning in 2007 and 2010 model years, respectively. Stringent non-road diesel engine standards phase in between 2008 and 2014. On March 2, 2007, the Administrator also proposed more stringent standards to reduce the PM and NOx emissions of locomotive and marine diesel engines.

Administrator Johnson's November 2005 memorandum also directed EPA offices to: (1) establish, as appropriate, measurable environmental justice commitments for eight national environmental justice priorities; and (2) identify the means and strategies to achieve the commitments and measure outcomes to help ensure that Agency resources reach disproportionately burdened communities, including minority and/or low-income communities. EPA's national environmental justice priorities relevant to this charge include: Reduce Asthma Attacks; Reduce Exposure to Air Toxics; and Collaborative Problem-Solving. Additionally, two priorities in Administrator Johnson's Action Plan pertain to diesel emissions reduction and SmartWay Transport.

THE CHARGE

EPA requests that the NEJAC provide advice and recommendations about how the Agency can most effectively promote strategies, in partnership with federal, state, tribal, and local government agencies, and other stakeholders, to identify, mitigate, and/or prevent the disproportionate burden on communities of air pollution resulting from goods movement.

As it considers this question, the NEJAC may wish to undertake the following activities or approaches:

- Through literature review and community input, identify and summarize the most significant community environmental and/or public health concerns related to air pollution from goods movement activities.

- Identify and summarize the types of data and tools that can be used to determine the location and magnitude of disproportionate impacts of air pollution related to goods movement activities on communities, and recommend ways in which the Agency can promote more effective utilization of such data and tools.

- Identify the key lessons learned regarding strategic alignment, collaboration, and partnerships to mitigate and/or prevent environmental and/or public health impacts on communities that could be replicated in areas affected by air pollution related to goods movement. Specifically, identify the venues and other mechanisms that EPA can use to work with other government agencies, industry, and communities, in areas such as environment, public health, and/or transportation, to reduce community exposure to air pollution from goods movement activities.

- Develop and recommend strategies for EPA and partners which utilize and promote meaningful community involvement in federal, state, tribal, and local government decision-making processes to address local environmental health impacts of goods movement. Specifically, identify strategies in such areas as environment, public health, and/or transportation, and those procedures for proposing and building new infrastructure related to goods movement. Agencies may include port authorities, federal and state departments of transportation, the U.S. Army Corps of Engineers, and metropolitan planning organizations.

- Develop a tool box of strategies that EPA and its government, industry, and community partners can promote to enhance current approaches (e.g., anti-idling, buy-outs of old trucks, capital investments to provide cleaner trucks, diesel collaboratives, and the CARE and Congestion Mitigation and Air Quality Improvement programs) being pursued which address community concerns related to goods movement. Such strategies could include the identification of existing, and the creation of, new community development financing programs that provide low-cost financing to businesses operating in environmentally sensitive areas. An example of a facility-based strategy is the development of an EMS that can be utilized to assess, address, and measure progress about air quality or other environmental and human health issues.

NEJAC Charge to the Goods Movement Work Group

Draft a report for consideration by the NEJAC Executive Council to document the significant impacts of air pollution resulting from goods movement activities and their incremental increase with projected growth. The draft report may include suggestions about how EPA can most effectively promote strategies, in partnership with federal, state, tribal, and local government agencies, and other stakeholders, to identify, mitigate, and/or prevent the disproportionate burden on communities by air pollution resulting from goods movement. The draft report should reflect the perspectives of all stakeholder groups and should reflect an effort to answer the following questions:

(1) What are the most significant community environmental and/or public health concerns related to air pollution from goods movement activities;
(2) How can information resources be used to better identify and assess the population segments or communities that are likely to bear the maximum burden of impacts;
(3) What strategies can EPA pursue to ensure mitigations of impacts and promote collaborative problem-solving and meaningful community involvement in the decision-making processes at the federal, state, tribal, and local government levels; and
(4) What strategies can stakeholders pursue to ensure emissions reductions, including but not limited to financing options, technological solutions, land use guidelines, as well as regulatory mechanisms.

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APPENDIX B

GLOSSARY of ACRONYMS and TERMS

Air Toxics – Pollutants that are known or suspected to cause cancer or other serious health effects (also known as hazardous air pollutants)

CAAAC – Clean Air Act Advisory Committee, a federal advisory committee of the U.S. Environmental Protection agency. The CAAAC provides independent advice and counsel on the development of policy and programs necessary to implement and enforce the requirements of Clean Air Act amendments enacted in 1990. The Committee is consulted about economic, environmental, technical, scientific, and enforcement policy issues.

CARB – California Air Resources Board, state air regulatory agency that is a part of the California Environmental Protection Agency, an organization which reports directly to the Governor's Office in the Executive Branch of California State Government. The mission of the Board is to promote and protect public health, welfare, and ecological resources through the effective and efficient reduction of air pollutants while recognizing and considering the effects on the economy of the state.[57]

CASAC – Clean Air Act Scientific Advisory Committee, a federal advisory committee of the U.S. Environmental Protection Agency. The CASAC provides independent advice on the scientific and technical aspects of issues related to the criteria for air quality standards, research related to air quality, source of air pollution, and the strategies to attain and maintain air quality standards and to prevent significant deterioration of air quality.

Conformity – Transportation conformity requires that new projects relying on Federal funding or approval are consistent with air quality goals. General conformity applies to projects to site, modify, or expand federal facilities (like military bases) and facilities relying on Federal funding or approval, like seaports and airports. Under the Federal Clean Air Act, both types of conformity are designed to ensure that these activities do not worsen air quality or interfere with the attainment of the National Ambient Air Quality Standards.

Drayage – Drayage typically refers to hauling containers or other cargo by truck at marine terminals or intermodal facilities.

EMS – Environmental Management System, a set of processes and practices that enable an organization to reduce its environmental impacts and increase its operating efficiency.
Gross Emitter – Vehicles that violate current emissions standards applicable to that vehicle and that have emissions that substantially exceed those standards.[58]

Goods Movement – Goods movement refers to the distribution of freight (including raw materials, parts, and finished consumer products) by all modes of transportation, including marine, air, rail, and truck.

PM – Particulate Matter

$PM_{2.5}$ or PM2.5 – Particulate matter equal to or smaller than 2.5 micrometers, also known as fine particulate matter

$PM_{0.1}$ or PM 10 – Particulate matter equal to or smaller than 100 nanometers, also known as ultra-fine particulate matter

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[57] http://www.arb.ca.gov/html/mission.htm
[58] http://www.epa.gov/ems/

PPM – parts per million

NOx – nitrogen oxide, a generic term for mono-nitrogen oxides produced during combustion, especially combustion at high temperatures.

SOx –sulfur oxide, a generic term describing emissions to air that mainly come from the combustion of fossil fuels containing variable proportions of sulfur.

µg/m^3 – Micrograms per cubic meter

VOC – Volatile Organic Compounds

WHO – World Health Organization, which is the directing and coordinating authority for health within the United Nations system. It is responsible for providing leadership on global health matters, shaping the health research agenda, setting norms and standards, articulating evidence-based policy options, providing technical support to countries and monitoring and assessing health trends.[59]

Yard equipment – Mobile cargo handling equipment is any motorized vehicle used to handle cargo delivered by ship, train, or truck, including yard trucks, top handlers, side handlers, reach stackers, forklifts, rubber-tired gantry cranes, dozers, excavators, loaders, mobile cranes, railcar movers, and sweepers[60].

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[59] http://www.who.int/about/en/

[60] California Air Resources Board. Regulation for Mobile Cargo Handling Equipment at Ports and Intermodal Rail Yards. February 2007. Available at: www.arb.ca.gov/ports/cargo/documents/chefactsheet0207.pdf

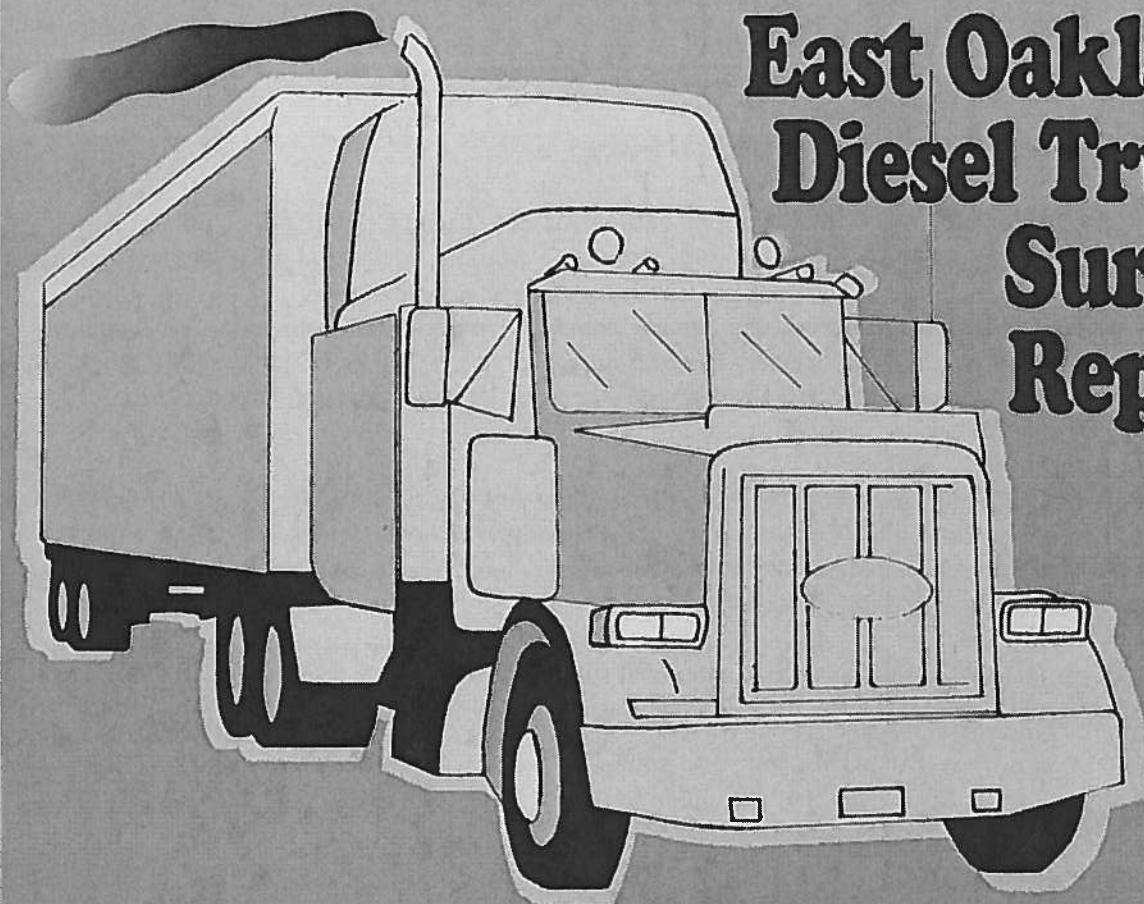
APPENDIX C

Summary of EPA FACA Recommendations Regarding Air Quality From Freight Movement and Environmental Justice

CHILDREN'S HEALTH PROTECTION ADVISORY COMMITTEE	CLEAN AIR ACT ADVISORY COMMITTEE	GOOD NEIGHBOR ENVIRONMENTAL BOARD
Children's Health and Climate Change – 8/30/05 Letter - EPA should use existing regulatory authority to require mandatory controls on US GHG emissions. - EPA needs to explore regulatory and other actions, alone or in partnership with the Department of Transportation, to reduce GHG emissions from mobile sources. - EPA should expand development of new technology through the Climate Change Technology Program, economic incentives, and other means, including technologies in energy generation, domestic and commercial energy use, mobile sources, manufacturing, and waste generation and management. **Lead Standard – 2/2/07 Letter** Not to revoke the current lead standard in NAAQS **Review of the NAAQS for Ozone Letter 3/23/07** - We urge that the lower- and more child protective- value of 0.060 ppm be selected from the range suggested by the CASAC. - We support the form of the new standard to be specified to the thousandths of ppm. - Children experience a wide variety of health impacts from ozone exposure that should be recognized in considering benefits from lowering the 8 hour ozone standard.	**Air Quality Management Subcommittee Recommendations to the CAAAC: Phase II, June 2007** - EPA, state, local governments, and tribes should adopt a comprehensive AQM planning process, and, through this process, create plans to move from a single pollutant approach to an integrated, multiple pollutant approach to managing air quality. - Improve environmental and health data - Take climate change into account - Support transportation and land use scenario planning - Integrate air quality planning into land use, transportation, and community development plans - Provide incentives for voluntary and innovative land use and transportation approaches **National Clean Diesel Work Group Recommendations for Reducing Emissions from the Legacy Diesel Fleet Presentation – 1/11/07** - Port Sector - Develop Emissions inventory - Port Sector - Share Best Practices: Educational Materials and Tools - Freight Sector - Increase demand for cleaner, more efficient freight	**9th Report: Air Quality and Transportation & Cultural and Natural Resources on the U.S.-Mexico Border** - Border Stations and Transportation Infrastructure: Bolster infrastructure, technology, personnel and related activities through substantial new funding, and intensify long-range planning and coordination at the bi-national, national, state and locals levels to cope with the congestion at border crossings, and thus reduce air pollution. - Emissions: Harness new and emerging technologies and fuels to reduce emissions from diesel trucks, buses, municipal and private fleets and passenger vehicles, and identify private/public funding sources to accelerate the process. - Public Transit and Alternatives to Driving Alone: Encourage public transportation, ridesharing, car-sharing, biking, and walking in border cities so that fewer people will drive alone, thus reducing motor vehicle trips and the emissions of pollutants.

ENVIRONMENTAL FINANCE ADVISORY BOARD	GOVERNMENTAL ADVISORY COMMITTEE	
Letter to Administrator Johnson, dated 11/1/07, and Report on Innovative Financing Programs for Air Pollution Reductions [1] EPA should develop a revolving loan fund for air quality modeled after the Clean Water State Revolving Loan and Safe Drinking Water State Revolving Fund. [1] EPA should encourage states to create Air Quality Finance Authorities (AQFA) or empower existing environmental finance authorities to finance certain types of air emission reduction equipment; or, at least create a state-wide or regional air emission reduction financing program. These AQFAs would issue lower interest bonds for emission reduction equipment as well as offer discounted price on SmartWay kits or other similar products. [1] EPA approach DOT regarding the use of the untapped $15 billion in private activity bonds to underwrite mobile source air emissions reduction efforts if this can be done on terms consistent with title 23 of the US Code.	**Letter to Administrator dated 05/10/06** [1] Renewable Energy Markets and Clean Fuels: The GAC supports and encourages more EPA and CEC projects that promote the use of cleaner fuels and development of renewable energy markets in North America. [1] Increase CEC Emphasis on Renewable Energy: The committee supports the work of the CEC on renewable energy and recommends an increasing emphasis on projects that would reduce reliance on fossil fuels and increase the availability and use of renewable energy sources. [1] Climate Change Impacts on Indigenous Peoples: Climate change has caused, and may cause further impacts to the traditional lifestyles of North America's indigenous peoples regardless of whether they live in the far northern hemisphere or hot, dry desert regions. The GAC expresses its profound concern about such social impacts to indigenous peoples in North America and encourages the U.S. Government to be acutely aware of such implications and consider the consequences of climate variability on Native Americans	

East Oakland Diesel Truck Survey Report



Communities for a Better Environment

CBE
www.cbecal.org

Diesel Truck Study Report
September 2010

Communities for a Better Environment ("CBE")
1904 Franklin St, Suite 600, Oakland, CA 94612
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Lots of thanks to the participants: CBE members: Fatima Adcock, Lucia Cordell, Otis Cunningham (driver); Mayor's Summer Program through Youth Uprising – Marcus, Maurice, Lamar, Nosa, Brittany, Sean, Mercedes; Maithy Nguyen, Oakland High Environmental Science Program; La'Nika; Ronisha; Jeff Rayos, University of California, Berkeley; Dina Mahmood, University of California, Los Angeles; Zuri Maunder, Truck Survey Site Supervisor; Tassafaronga Recreation Center – Cynthia and Tanika, thanks for the space and welcoming CBE; East Bay Academy of Young Scientists; Nicole Flórez, JFK University.

Thanks to the West Oakland Environmental Indicators Project and Phil Martien, Bay Area Air Quality Management District for sharing their experience and information on the West Oakland diesel truck studies and to Milton Lewis, Teamsters. Apologies for missing anyone else who helped make this project happen. We deeply appreciate your support.

The diesel truck project was made possible by financial support from the U.S. Environmental Protection Agency Environmental Justice Program. CBE is responsible for all findings and conclusions of the report.

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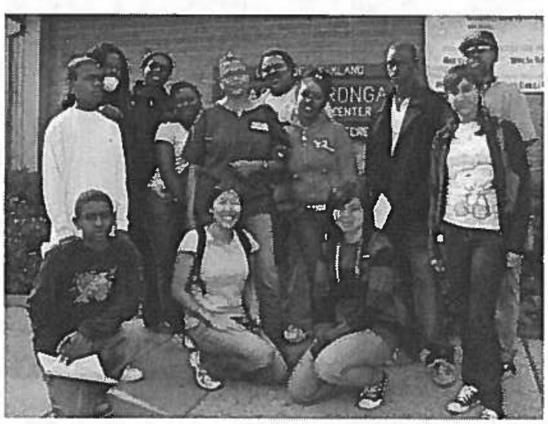


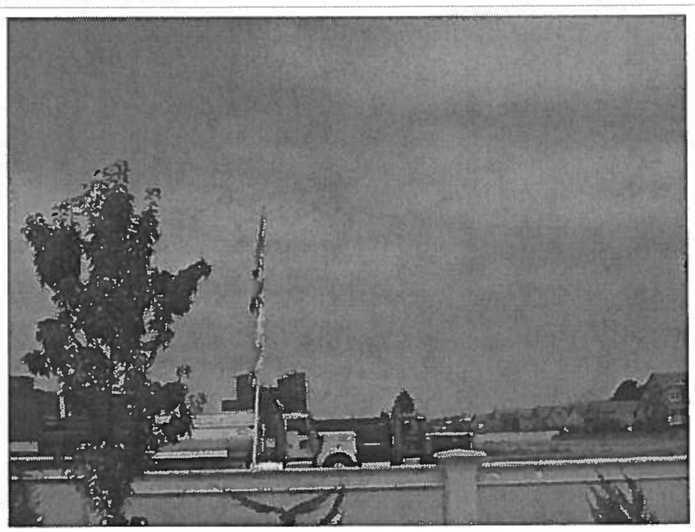
Truck study participants: Youth from Mayor's Summer Program through Youth Uprising, CBE staff and community members.

INTRODUCTION

In 2007, Communities for a Better Environment (CBE) undertook a study[1] of cumulative impacts in East Oakland and found East Oakland residents are living in close proximity to toxic pollution and are disproportionately burdened by cumulative impacts.[2] This community-based research found a higher concentration of sensitive receptors and hazards in East Oakland than the inventories maintained by regulatory agencies showed. The study found 216 hazards and 49 sensitive receptors near homes in a small area of East Oakland. Based on their observations, CBE members next prioritized documenting and addressing the problem of the diesel trucks driving through residential areas, passing schools and recreation centers, parking and idling (leaving their engines on while parked) illegally in neighborhoods.

Trucks parked on San Leandro Street by 81st Ave in East Oakland.

Diesel trucks that are used for industrial purposes and the movement of raw materials and consumer goods have environmental justice impacts in East Oakland. Diesel trucks emit cancer-causing air pollution. Emissions from diesel trucks include benzene, particulate matter, polycyclic aromatic hydrocarbons, heavy metals, and soot. In addition to being carcinogenic, these substances contribute to increased risk of asthma, respiratory disease and cardiovascular disease. Children, elderly and people with pre-existing diseases are especially vulnerable to these risks. More research is showing the links between diesel pollution and the onset of respiratory and cardiovascular disease.



American Container Storage on San Leandro St and 92nd Ave in East Oakland with Port containers stacked higher than homes at Pulte site.

Diesel truck emissions – the cloud coming out of the smoke stack on the side of trucks – are a mixture of gases and solids, including organic and black carbon, particulate matter (PM), ozone precursors (volatile organic compounds such as formaldehyde and acrolein, and nitrogen oxides), toxic metals, carbon monoxide, and sulfur oxides. Of these substances, 40 are listed as toxic chemicals by the California

[1] In collaboration with Rachel Morello-Frosch, Jim Sadd, and Manuel Pastor.

[2] Anna Yun Lee. 2008. *Cumulative Impacts in East Oakland: Findings from a community-based mapping study*. Available at: http://cbecal.org

Environmental Protection Agency. Diesel Particulate Matter (PM) can be large enough to see (soot) or smaller than the human eye can see. These particles can penetrate deep into the lungs and enter the bloodstream. Diesel trucks that transport freight make up approximately 50% of total diesel PM in California[3]. Diesel soot reduces visibility and is a strong player involved in global warming.

Diesel pollution is linked to adverse health problems and is a human carcinogen (See Figure 1). Short-term exposure to diesel PM can aggravate allergies, induce and exacerbate asthma symptoms, bronchitis and other lung disease.[4] Long-term exposure to diesel PM greatly increases a person's chances of developing lung cancer, cardiopulmonary disease, cardiovascular disease, asthma and bronchial infections.[5] Long-term, chronic or everyday exposure to particle pollution has been linked to shorter life-spans, premature births, increased risk of death due to lung cancer and cardiovascular disease, reduced lung growth and function in children, significant damage to the airways deep in the lungs, and increased hospitalizations for asthma attacks for children living near roads with heavy truck or trailer traffic.[6] The exposure of expecting mothers to elevated levels of diesel emissions such as polycyclic aromatic hydrocarbons (PAHs) have been linked to negative effects on children as they grow older. Short-term exposure to high levels of diesel PM is especially dangerous to children, elderly and those with existing medical conditions.[7] Truck drivers often face the highest exposure to diesel exhaust and are undercompensated for health effects in the freight transport

Air pollutant	Health effects by inhalation
Particulate matter	Can trigger asthma attacks, aggravate other lung diseases, cause lung cancer, interferes with blood getting oxygen, increase risk of death from heart disease
Sulfur compounds	Constriction of the air ways (severe for asthma sufferers), bronchitis-like conditions
Nitrogen oxides (especially nitrogen dioxide)	Lung irritation, aggravated asthma or chronic bronchitis, bronchitis and emphysema-like conditions, increased susceptibility to respiratory infections
Volatile Organic Compounds (VOCs): benzene, PAHs, 1,3-butadiene, and formaldehyde	Genetic mutations, reproductive problems, or cancer
Toxic particulates like metals	Genetic mutations, reproductive problems, or cancer
Ozone (formed from diesel components)	Coughing, chest pain, shortness of breath, eye, nose, and throat irritation; aggravated asthma, bronchitis, emphysema, heart disease and reduced resistance to colds and pneumonia

Figure 1. Table of direct or secondary air pollutants that generally make up diesel emissions and related health effects by inhalation.

[3] Lin, J; S Prakash. August 2008. Taking a Toll: The High Cost of Health Environment & Worker Impacts of the Oakland Port Trucking System. East Bay Alliance for Sustainable Economy and Pacific Institute. Available: http://www.pacinst.org/reports/taking_a_toll/taking_a_toll.pdf

[4] California Environmental Protection Agency, California Air resources Board and the Office of Environmental Health Hazard Assessment. April/ May 1998. *Proposed Identification of Diesel Exhaust as a Toxic Air Contaminant.*

[5] Lin, J; S Prakash. August 2008.

[6] American Lung Association. 2009. State of the Air Report 2009. Available at: http://www.lungusa2.org/sota/2009/SOTA-2009-Full-Print.pdf

[7] Lin, J; S Prakash. August 2008.

industry[8] and also have higher risks of dying from lung cancer and heart disease.[9]

The Port of Oakland is the fifth largest seaport in the nation, based on annual container traffic. It has facilities for railroad and trucking operations to transport cargo brought in from ships. The Port operates over 13 container terminals that received 1,965 cargo vessels in 2006. Over 2 million freight containers were moved via the Port of Oakland in 2009, an 8% decrease from 2008.[10] The Port of Oakland is located in West Oakland. In Oakland, trucks weighing over 4.5 tons (these are heavy-duty trucks) are prohibited on Interstate 580 and can only use Interstates 80 and 880. Interstates 80 and 880 are located in the flatlands of Oakland, which are predominantly low-income communities of color. In 2005, Alameda County accounted for almost a quarter of the Bay Area annual average particulate matter (PM) 2.5 emissions and heavy-duty diesel trucks emitted on average 1.0 ton/ day PM 2.5 in Alameda County compared to 2.3 tons/ day PM 2.5 Bay Area-wide.[11] These communities are disproportionately burdened by diesel pollution and have some of the highest cancer risks in the Bay Area (See Figure 2). Diesel trucks have other impacts that also affect health outcomes. Trucks often idle – leaving engines on while stopped or parked– in neighborhoods like East Oakland and in the process emit significant amounts of diesel emissions.[12] Trucks often drive on residential streets or in close proximity to residential areas. Heavy-duty trucks and related businesses have impacts on residents from noise, vibrations, safety, and damage to

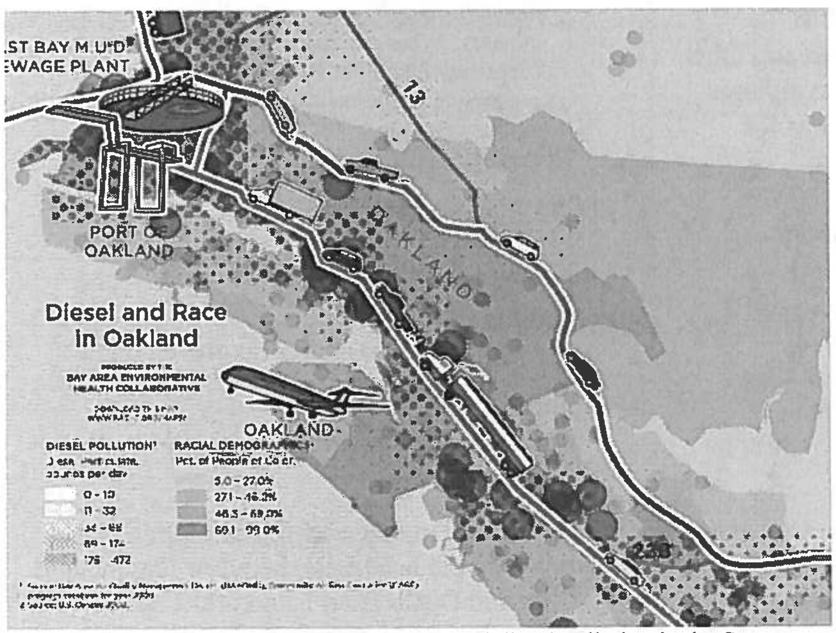


Figure 2. A map of the freeways and associated diesel pollution in the San Francisco East Bay. Diesel trucks do not use I-580 in the Oakland Hills; they take I-880 in the flatlands in low-income communities of color. Industry, warehousing and distribution centers are also located in the flatlands, contributing to the Cumulative Impacts in these communities.

[8] Palaniappan, M; S Prakash, D Bailey. November 2006. Paying With Our Health: The Real Cost of Freight Transport in California. Pacific Institute. Available: http://www.pacinst.org/reports/freight_transport/PayingWithOurHealth_Web.pdf

[9] American Lung Association. 2009. State of the Air Report 2009. Available at: http://www.lungusa2.org/sota/2009/SOTA-2009-Full-Print.pdf

[10] American Association of Port Authorities. North America Container Traffic 2009 Port Ranking by TEUs. Available at: http://aapa.files.cms-plus.com/Statistics/NORTHAMERICANPORTCONTAINERTRAFFIC2009.pdf

[11] Bay Area Air Quality Management District. Base Year 2005 Emissions Inventory Summary Report. December 2008. Available at: http://www.baaqmd.gov/Divisions/Planning-and-Research/Emission-Inventory-and-Air-Quality-Related/~/media/A06B5C918A5F413B9BDBE0B63AC2340E.ashx

[12] Palaniappan, M; S Prakash, D Bailey. November 2006.

roads.[13] These localized activities can have a significant impact on community health and safety from increased exposures and added chronic stress.

In the Bay Area:

Currently, reduction strategies are needed in the Bay Area to meet standards for PM 2.5 set by the U.S. Environmental Protection Agency. In the Bay Area in 2005, annual estimates of health impacts from Port (heavy-duty trucks) trucks alone add up to approximately $153 million in health costs and include: [14]

- 18 premature deaths
- 284 cases of asthma and other lower respiratory symptoms
- 9 hospital admissions for respiratory reasons
- 4 hospital admissions for cardiovascular reasons
- 1,650 Work loss days
- 17,875 Minor restricted activity days
- 5,042 Missed school days

Alameda County's childhood asthma hospitalization rate is the second highest in California.[15]

Bay Area Truckers: Don't Sit Idle

The California idling law says:

- It is illegal for any diesel-fueled truck over 10,000 lbs. to idle its primary engine for more than 5 minutes
- Big rigs with sleeper cabs may only use auxiliary power systems when they are more than 100 ft. from residential areas
- School buses must turn off engine upon arrival
- When not waiting for passengers to board, it is illegal for transit buses to idle for more than 5 minutes. When waiting for passengers to board, buses may idle for no more than 10 minutes. If passengers are on-board, buses have no idling limit.
- Port terminals may not keep truckers waiting longer than 30 minutes

Turn off your engines and save money on fuel and help the communities breathe cleaner air!

Violators face a $300–$1,000 fine or criminal charges.

Report Violators:

- **Call Bay Area Air District: 1-800-EXHAUST**
- **Call Air Resources Board: 1-800-END-SMOG**
- **Go online:** **http://www.arb.ca.gov/enf/complaints/complaints.htm**

Reducing diesel emissions in East Oakland is part of the solution to reducing the disproportionate health burdens for the most impacted communities and closing the health gap between flatland and Oakland Hills residents. The following excerpt from "Life and Death from Unnatural Causes" (2008) describes how the environment one grows up in – from the physical place where you live, your ethnicity, your income level, etc – are determinants of your health and how these health outcomes are astoundingly unequal between the Oakland Hills and the flatlands:

> Compared with a White child in the Oakland Hills, an African American born in West Oakland is 1.5 times more likely to be born premature or low birth weight, seven times more likely to be born into poverty, twice as likely to live in a home that is rented, and four times more likely to have parents with only a high school education or less.
>
> As a toddler, this child is 2.5 times more likely to be behind in vaccinations. By fourth grade, this child is four times less likely to read at grade level and is likely to live in a

[13] Lin, J; S Prakash. August 2008.

[14] Lin, J; S Prakash. August 2008.

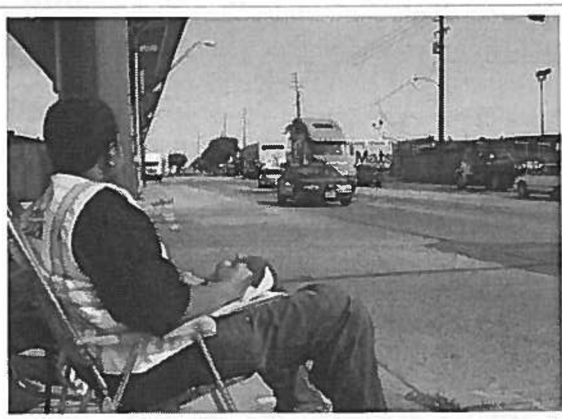
[15] Roberts EM, English PB, Wong M, WolffC, Valdez S, Van den Eeden SK, et al. Progress in pediatric asthma surveillance II: geospatial patterns of asthma in Alameda County, California. Prev Chronic Dis. 2006 July. Available from: http://www.cdc.gov/pcd/issues/2006/jul/05_0187.htm

neighborhood with twice the concentration of liquor stores and more fast food outlets. Ultimately, this adolescent is 5.6 times more likely to drop out of school and less likely to attend a four-year college than a White adolescent.

As an adult, he will be five times more likely to be hospitalized for diabetes, twice as likely to be hospitalized for and to die of heart disease, three times more likely to die of stroke, and twice as likely to die of cancer. Born in West Oakland, this person can expect to die almost 15 years earlier than a White person born in the Oakland Hills.[16]

The accumulated environmental impacts are contributing to the enormous health disparities we see in East and West Oakland. East Oakland has a childhood asthma hospitalization rate 1.5 to 2 times higher than the Alameda County rate.[17] The childhood asthma rate for African American children is 2.5 times higher than the County rate; 12 times the Asian/ Pacific Islander rate and about 4 times the Latino and White rates.[18]

Retrofitting older truck engines, especially from heavy-duty trucks, by installing diesel filters helps to clean up diesel particulates. In 2004 and 2005 the California Air Resources Board (CARB) passed a 5-minute engine idling control regulation for heavy-duty diesel vehicles. Subsequently, in 2008, CARB passed a regulation to require all on-road heavy-duty diesel truck and bus engines travelling in California to have a 2010 year diesel engine or equivalent by 2023 with intermediary requirements starting in 2011. These regulations will significantly help to reduce pollution burdens so long as they are adequately implemented and enforced. However, they do not eliminate all health impacts from diesel trucks. Ports, freeways, truck routes and magnet sources are still located in low-income communities of color.



EBAYS youth counting a 3-axle Bobtail Port truck at 81st Avenue and San Leandro Street

[16] Alameda County Public Health Department. August 2008. Life and Death from Unnatural Causes: Health and Social Inequity in Alameda County. Available: http://www.acphd.org/AXBYCZ/Admin/DataReports/00_2008_full_report.pdf

[17] Alameda County Public Health Department. August 2008. Life and Death from Unnatural Causes: Health and Social Inequity in Alameda County. Available: http://www.acphd.org/AXBYCZ/Admin/DataReports/00_2008_full_report.pdf

[18] Alameda County Public Health Department. August 2008.

CBE DIESEL TRUCK STUDY

We set out to examine one aspect of cumulative impacts – diesel trucks – in East Oakland. This East Oakland (EO) truck study is a community-based participatory research project completed in the summers of 2009 and 2010 to get more detailed data on the localized impacts of diesel trucks in East Oakland.

> "My wish is that I am not constantly bombarded and over-ran on a daily basis in my residential community by 18-wheelers. There is no sharing of the road and residential streets with the 18-wheeler because he is King."
>
> -- Maxine Oliver-Benson, CBE member

We set out to determine the number of diesel trucks traveling through major and minor intersections in the area of East Oakland where major industry is adjacent to residential areas; identify the routes the truckers are using in comparison to the City truck route (See Figure 3); and obtain information about truck pollution.

This truck study methodology relies heavily on the study conducted in West Oakland by West Oakland Environmental Indicators Project with the Bay Area Air Quality Management District and consultants. Participants included: community members, CBE staff, an Oakland High Environmental Science student, youth interns from Youth Uprising, students from the East Bay Academy of Young Scientists, and interns from UC Berkeley and Los Angeles. CBE hired Zuri Maunder, an experienced truck surveyor from the West Oakland Truck Survey, to help provide oversight and quality assurance. CBE staff conducted the training, created materials and supplies and coordination. Staff at the Bay Area Air Quality Management District (BAAQMD) reviewed plans and obtained truck engine ages from license plate information.

How We Did It

CBE conducted the diesel truck survey from July 27 through August 6 and on October 26, 2009 at 13 locations. Counting locations were chosen on main arterials to entrances or exits for Interstate 880 and where the entrances and exits were in close proximity to schools, parks, and recreation centers (See Table 1 and Figure 4). Truck data was collected during the busiest days of the week – Monday through Thursday.

UC Intern and youth working together to count a 5-axle non-Port truck at 98th Avenue and San Leandro Street.

Teams were trained to count and classify trucks (in particular distinguishing between Port container trucks, non-drayage container trucks, and other trucks) and to collect license information (See Appendix for Operating Protocol). Surveyors counted trucks during 4 hour shifts – a morning shift from 9:30am – 1pm and an afternoon shift 1pm – 5pm. At each of the survey locations, teams recorded the number of axles on each passing truck, identified whether the truck was a Port truck, direction of travel and license plate data (See Appendix, Table 4)[19].

Surveyors were trained to determine locations to safely and efficiently count trucks. Frequency varied. Busy intersections were surveyed two 8-hour days total, while less busy intersections were surveyed only one 4-hour day. While counting trucks, survey teams also collected truck license plate data (about 10 licenses per hour) in order to gauge the engine year distribution of the diesel engines. This information was compiled by BAAQMD staff from Department of Motor Vehicles records.

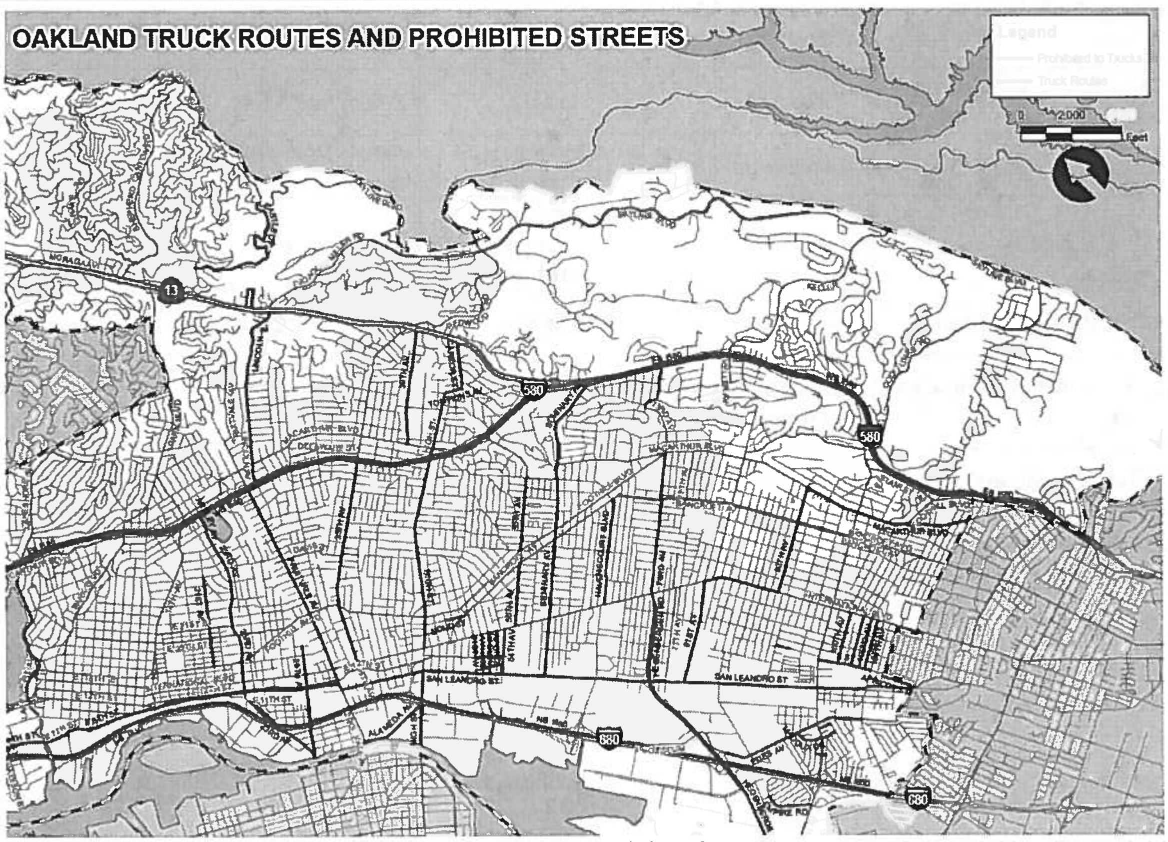


Figure 3. Snapshot of the Oakland truck routes and prohibited streets in most of East Oakland. Available for download at: http://www.oaklandnet.com/government/ceda/dcsd_ts_truckroutes.asp

[19] One caveat: A small portion of container trucks are attributed to local businesses that may not necessarily be Port-related and destined for transport via ship or train.

Table 1. Truck Study Locations				
Intersection	Significance	Visits	Observation location	Surveyors
1.) 66th Ave @ International	Truck route; residences, schools	2 weekdays	Near schools	2-3
2.) 66th Ave @ San Leandro Street (SLS)	Truck route; residences, school	4 dates- 2 mornings, 2 afternoons	Sidewalk corners closer to residences	4
3.) Hegenberger Road @ Baldwin	Roadway from I-880 to heavy industry	4 dates- 2 mornings, 2 afternoons	Grassy area under tree	4
4.) 73rd Ave @ International Blvd	Truck route	Half-day	Empty lot corner	4
5.) 73rd Ave @ SLS	Roadway to I-880	1 morning, 1 afternoon	Across from BART station	2
6.) 75th Ave @ SLS	Truck route	4 dates- 2 mornings, 2 afternoons	Near BART tracks	2
7.) 81st Ave @ International	Truck route	Half-day	Near housing	4
8.) 81st Ave @ SLS (unique log sheet)	Truck route; schools and future library	4 dates- 2 mornings, 2 afternoons	Near BART tracks	2
9.) 85th @ Baldwin Ave	Roadway to I-880	2 mornings	Corner opposite Enterprise Ctr	2
10.) 85th Ave @ Edes Ave	I-880 exit, USPS, FedEX; residences	2 afternoons	SE corner closest to USPS property	2
11.) 85th Ave @ SLS	Truck route; recreation center	4 dates- 2 mornings, 2 afternoons	Corners closer to residences	4
12.) 90th Ave @ International	Truck route	Half-day	Parking lot corner	4
13.) 98th Ave @ SLS	Truck route	4 dates- 2 mornings, 2 afternoons	Corner opposite BART tracks	4

Figure 4. Map of truck survey locations (green markers) and City of Oakland designated truck routes (blue lines).

Number of truck axles is used to classify trucks because bigger and more polluting trucks such as freight trucks have more axles to support heavier loads. Truck axles are the supporting shaft/ beam that holds the tires in place on either side of a vehicle. The number of axles corresponds to the number of visible tires from a side-view of a truck. One axle holds two tires, one on each side of a vehicle. A single axle is counted even in cases where more than two tires are positioned on a single axle. Teams recorded the number of trucks based on the number of axles (See Appendix for more details on truck classification). Port trucks were categorized into three types depending on axle, tractor and trailer articulation with and without a container. The three types were bobtail, chassis and container trucks.

What We Found

CBE counted a total of 11,664 diesel trucks over eight 4-hour days in the Summer of 2009 with additional counting (See Table 2).

Table 2. Results of Truck Counting

INTERSECTION	TOTAL TRUCKS	TOTAL TRUCKS, A.M.	TOTAL TRUCKS, P.M.	A.M. #1	A.M. #2	P.M. #1	P.M. #2	NO. OF A.M. VISITS	NO. OF P.M. VISITS
66TH, INTL	646							2	2
73RD, INTL	179	0	179	0	0	179	0	0	1
81ST, INTL	222	0	222	0	0	222	0	0	1
90TH, INTL	119	0	119	0	0	119	0	0	1
85TH, EDES	311	0	311	0	0	168	143	0	2
HEGENBERGER, BALDWIN	2146	1016	1130	515	501	453	677	2	2
85TH, BALDWIN	484	484	0	235	249	0	0	2	0
66TH, SLS	1592	805	787	374	431	364	423	2	2
73RD, SLS	586	400	186	400	0	186	0	1	1
75TH, SLS	1386	711	675	381	330	287	388	2	2
81ST, SLS	759	284	475	284	0	234	241	1	2
85TH, SLS	1218	697	521	296	401	241	280	2	2
98TH, SLS	2016	923	1093	449	474	492	601	2	2
TOTAL: 11664									

Average daily truck volume was highest at Hegenberger Road at Baldwin; then 98th Ave at San Leandro Street; and lowest at 66th Ave at International Blvd (See Figure 5). The average morning truck volume was highest at Hegenberger Road at Baldwin; then 98th Ave at San Leandro Street; and lowest at 85th Ave at Baldwin (See Figure 5). The average afternoon truck volume was highest at Hegenberger Road at Baldwin; then 98th Ave at San Leandro Street; and lowest at 90th Ave at International Blvd (See Figure 5). The excluded intersections were not surveyed in the morning or afternoon or did not have data organized by time of day.

Generally, the intersections along International Blvd had lower afternoon truck counts compared to the average afternoon counts at the intersections along San Leandro Street. Morning averages were either the same or higher than afternoon averages at the respective intersections along San Leandro Street except for Hengenberger Road at Baldiwn and 98th Ave at San Leandro Street, which had a higher afternoon average.

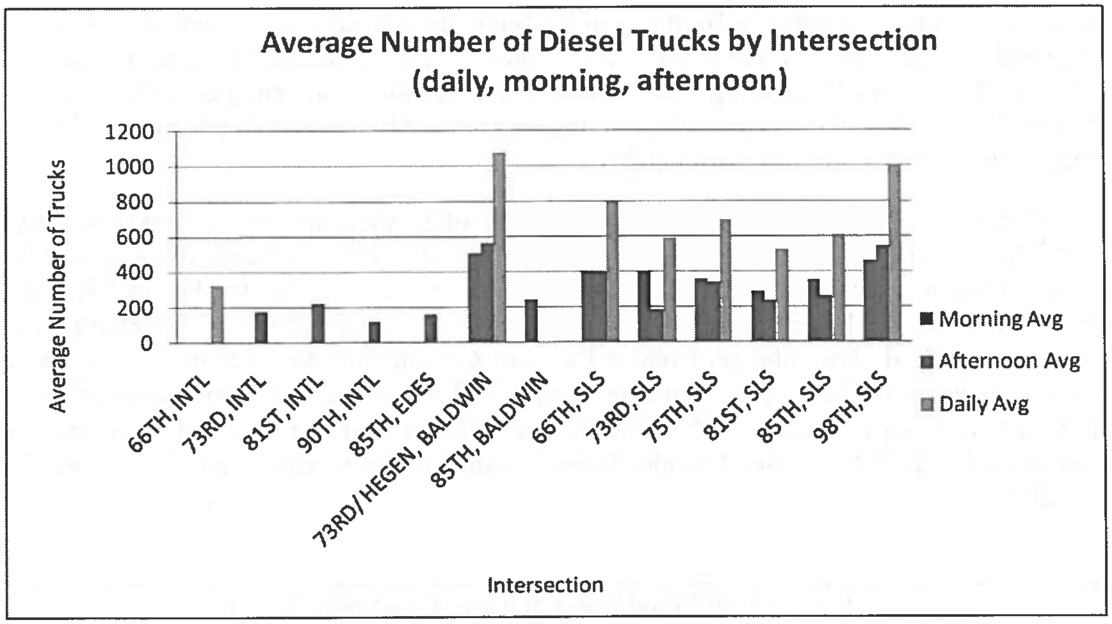


Figure 5. Average number of diesel trucks by intersection daily and for mornings (9:30am - 1pm) and afternoons (1pm-5pm). Morning data was not collected along International Blvd and for 85th Avenue at Edes Avenue. The actual totals are shown for 73rd Avenue at San Leandro Street and the intersections along International Blvd; for the morning count for 81st Avenue at San Leandro Street; and daily counts for 73rd Avenue and 81st Avenue at San Leandro Street. SLS = San Leandro Street.

The largest category of trucks counted were 2-axle trucks. 3-axle or more trucks made up 50% of the trucks counted (See Figure 6). 5-axle non-Port trucks as well as 3-axle non-Port trucks made up large categories of trucks. Port trucks (3-axle bobtail, 5-axle I-beam and 5-axle Port container trucks added together) were a significant category of trucks and made up about 14% of the trucks counted.

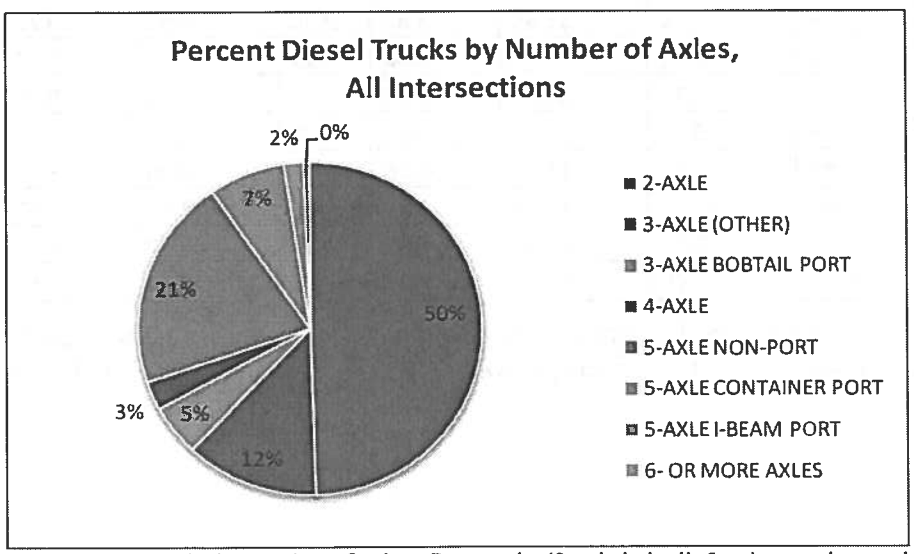


Figure 6. Percentage of diesel trucks by number of axles. Port trucks (3-axle bobtail, 5-axle container and 5-axle I-Beam diesel trucks added together) made up approximately 14% of total trucks counted.

The intersections along International Blvd had more 2-axle diesel trucks (65% and up) than the overall percentage with 3-axle Non-Port trucks and 5-axle Non-Port trucks making up the next largest types (See Table 3). The intersections along San Leandro Street had lower percentages of 2-axle trucks and more Port trucks (3-axle Bobtail, 5-axle Port Container and 5-axle I-beam), 5-axle non-Port and 6-axle trucks than intersections along International Blvd.

66th Ave at San Leandro Street had the highest percentage of 3-axle non-Port and 3-axle Bobtail trucks. 85th Ave at Baldwin Ave had the highest percentage of 4-axle and 5-axle non-Port trucks. Hegenberger Road at Baldwin also had a high percentage of 5-axle non-Port trucks. 66th Ave at International Blvd had the largest percentage of 5-axle Non-Port trucks (20%) of the intersections along International Blvd. Hegenberger Road at Baldwin Ave and 66th Ave at San Leandro Street had the highest percentages of 5-axle Port container trucks. 75th Ave at San Leandro Street had the highest percentage of 5-axle I-beam trucks. 81st Ave at San Leandro Street had the highest percentage of 6-axle or more trucks. 66th Ave at San Leandro Street had the highest percentage of Port trucks inclusive (20.42%).

Table 3. Percent Diesel Trucks at Intersections by Axle Type

INTERSECTION	TOTAL TRUCKS, ALL TIMES	2-axle	3-axle Non-Port	3-axle Port Bobtail	4-axle	5-axle Non-Port	5-axle Port Container Truck	5-axle Port I-Beam Chassis	6- or more axle
66TH, INTL	646	64.55	11.15	2.32	1.24	19.97	0.62	0.15	0
73RD, INTL	179	81.01	11.17	0.56	1.12	6.15	0	0	0
81ST, INTL	222	91.44	5.41	0.45	0.90	1.80	0	0	0
90TH, INTL	119	87.39	5.04	0.84	1.69	5.04	0	0	0
85TH, EDES	311	59.81	12.86	4.50	3.54	12.86	3.54	2.57	0.32
HEGENBERGER, Baldwin	2146	37.74	13.65	3.87	3.26	29.92	10.72	0.51	0.33
85TH, Baldwin	484	37.81	11.57	5.58	4.13	31.82	5.17	3.51	0.41
66TH, SLS	1592	47.36	14.51	7.54	2.32	15.01	10.68	2.20	0.38
73RD, SLS	586	56.31	12.29	3.58	1.88	18.09	7.17	0.34	0.34
75TH, SLS	1386	48.12	13.20	5.56	1.95	16.96	8.73	5.05	0.43
81ST, SLS	759	45.32	11.59	7.25	3.82	21.61	6.32	1.71	2.37
85TH, SLS	1218	50.99	10.34	6.32	2.87	18.39	8.21	2.05	0.82
98TH, SLS	2016	50.50	12.95	4.37	3.52	22.27	4.17	1.64	0.60

Averages for 4-axle or more truck volumes varied among the intersections. The highest daily, morning and afternoon 4-axle+ truck averages was at Hegenberger Boulevard and Baldwin Avenue (See Figure 7).

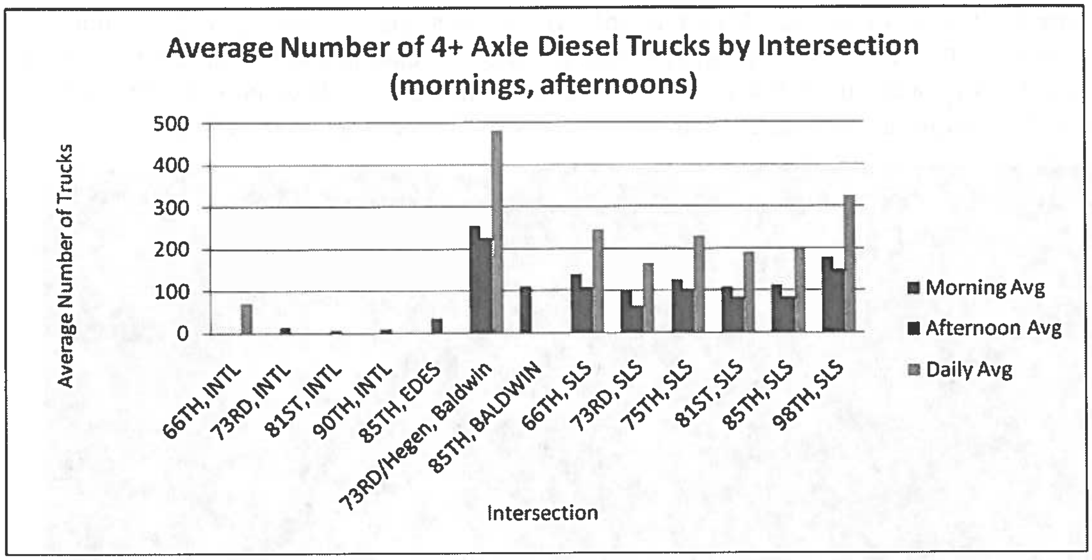


Figure 7. Average 4- axle+ diesel truck volumes by intersection (daily; mornings (9:30am-1pm); and afternoons (1pm-5pm). Morning data was not collected at 73rd, 81st, 90th and 85th and Edes Avenues. Afternoon data was not collected at 85th Avenue at Baldwin Avenue.

Truck engine years varied from 1951 to 2009 (see Figure 8). The median year was 2000. Out of the list of 1790 truck license numbers collected, 1163 trucks were available with engine year information in the DMV database.

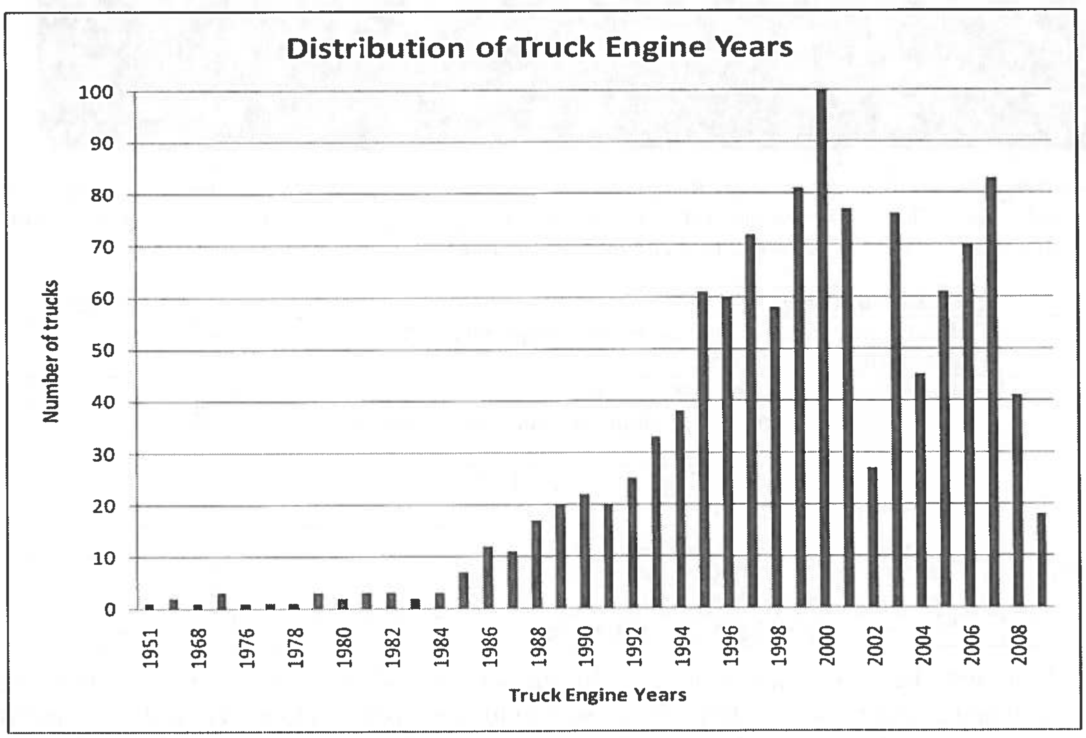


Figure 8. Distribution of truck engine years from available license plate information collected. Total license plate numbers recorded was 1790. The number of trucks found in DMV database was 1163 trucks.

The following figures (9 through 20) are in order of intersections with the highest total number of trucks observed, to the lowest. The arrows indicate direction and their color represent the range of number of trucks observed. Arrows were not included when trucks observed were 50 trucks or less only to reduce clutter in the images. All totals for trucks observed are in the tables.

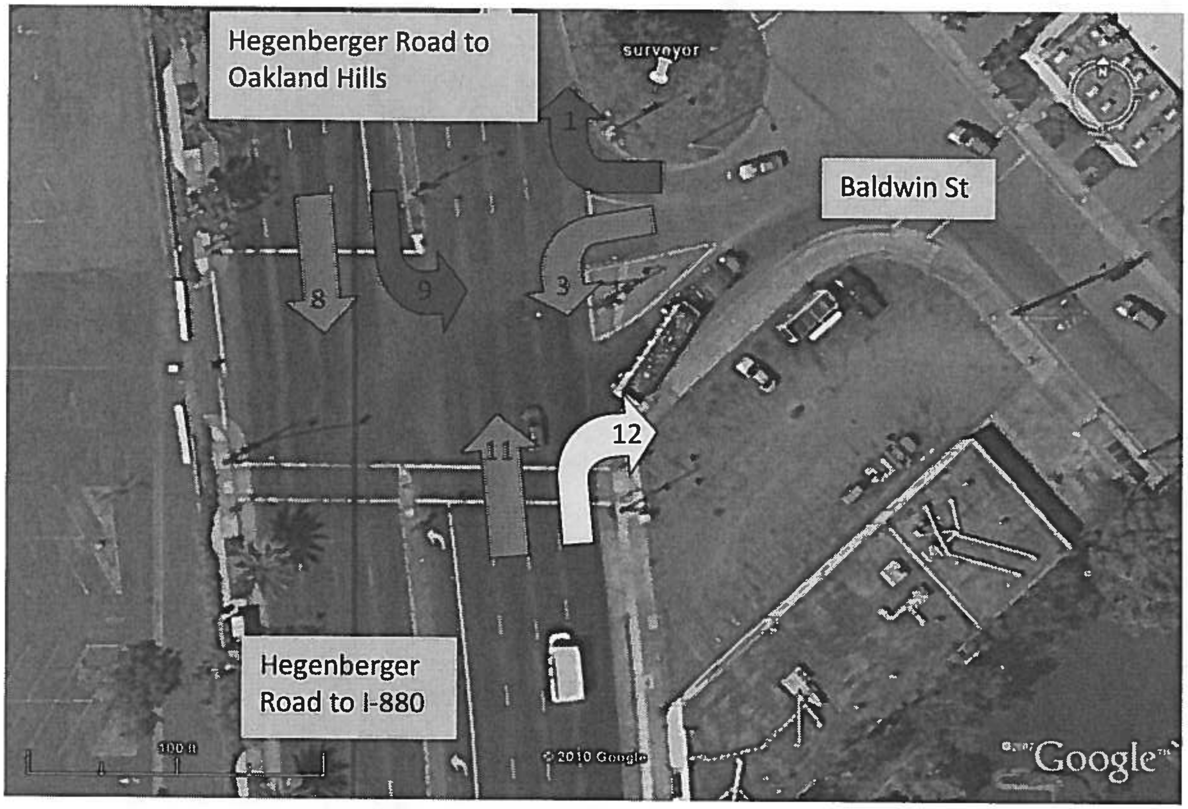


Figure 9. Hegenberger Road and Baldwin Street. Red arrow: >400 trucks; yellow arrow: 200-400 trucks; blue arrow: 100-200 trucks; purple arrow: <100 trucks. The table below shows the truck volumes for each direction of movement. Total consists of 2 weekdays of counting, approximately 9:30-5pm. Blue line indicates the Oakland truck route.

Arrow	Direction of travel	Total Trucks
1	Baldwin Street turning right on Hegenberger Road towards Oakland Hills; west to north	40
2 (not shown)	Baldwin Street towards Coliseum; west	1
3	Baldwin Street turning left on Hegenberger Road towards I-880; west to south	503
7 (not shown)	73rd turning right towards Coliseum; south to west	0
8	73rd towards I-880; south	540
9	73rd turning left on Baldwin; south to east	56
10 (not shown)	73rd turning left towards Coliseum; north to west	7
11	73rd towards Oakland Hills; north	623
12	73rd turning right on Baldwin; north to east	376

Hegenberger Road was the busiest intersection (2146 trucks total). Most trucks were using Hegenberger Road to and from I-880 and to Baldwin Ave; from Baldwin Ave towards I-880 (Figure 9). Baldwin connects 73rd Ave and 85th Ave where there are businesses such as Golden Gate Truck Co., World PAC and container storage.

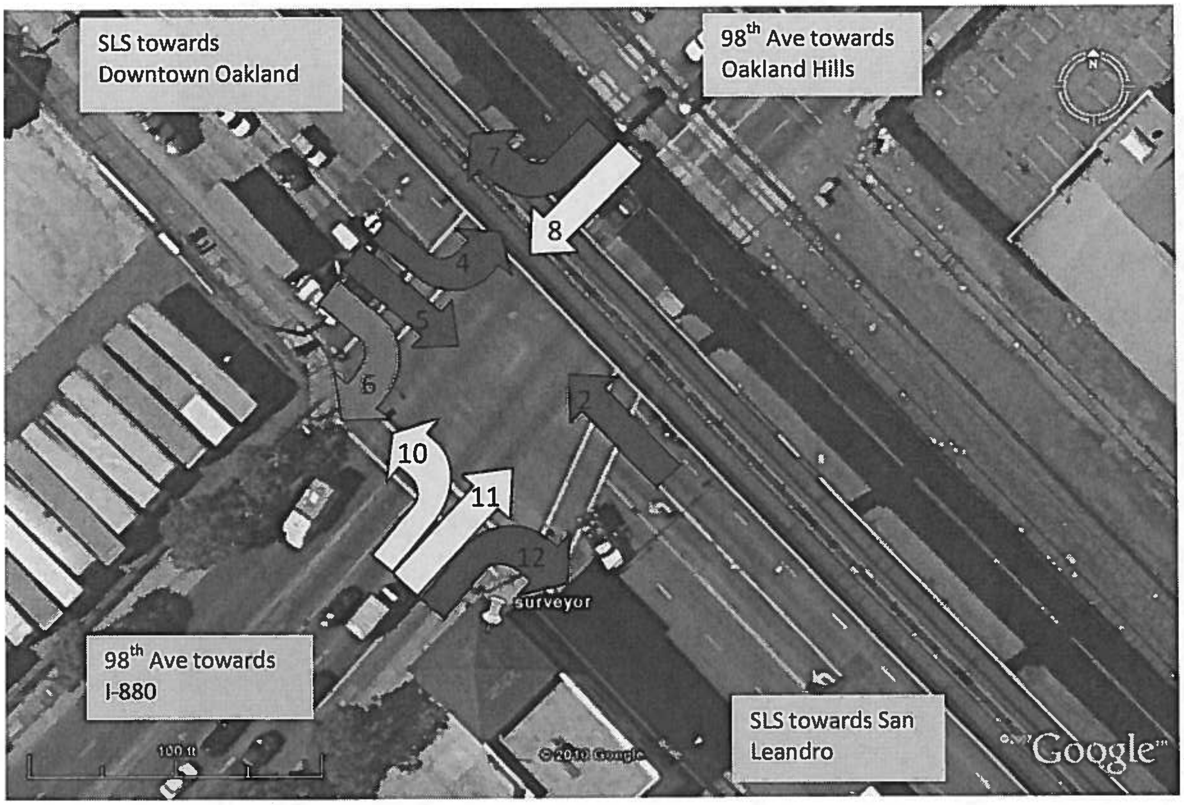


Figure 10. 98th Ave and San Leandro St. Red arrow: >400 trucks; yellow arrow: 200-400 trucks; blue arrow: 100-200 trucks; purple arrow: <100 trucks. The table below shows the truck volumes for each direction of movement. Total consists of 2 weekdays of counting, approximately 9:30-5pm. Blue line indicates the Oakland truck route.

Arrow	Direction of travel	Total Trucks
1 (not shown)	San Leandro Street (SLS) turning right on 98th towards Oakland Hills; northwest to northeast	10
2	SLS towards downtown Oakland; northwest	90
3 (not shown)	SLS turning left on 98th towards I-880; northwest to southwest	43
4	SLS towards San Leandro turning left on 98th; southeast to northeast	68
5	SLS towards San Leandro; southeast	91
6	SLS towards San Leandro turning right on 98th towards I-880; southeast to southwest	421
7	98th Ave turning right on SLS towards downtown; southwest to northwest	63
8	98th Ave towards I-880; southwest	387
9 (not shown)	98th Ave turning left on SLS towards San Leandro; southwest to southeast	18
10	98th Ave turning left on SLS towards downtown; northeast to northwest	364
11	98th Ave towards Oakland Hills; northeast	389
12	98th Ave turning right on SLS towards San Leandro; northeast to southeast	72

98th Ave and San Leandro St (SLS) was the second busiest intersection (2016 trucks total). Although there were many trucks moving in all directions, most trucks were using 98th Ave to and from I-880 and to SLS (Figure 10 and table above). The most were observed coming from SLS and turning onto 98th Ave; many were Port trucks. PACAM Foreign Trade Zone is at 98th and SLS.

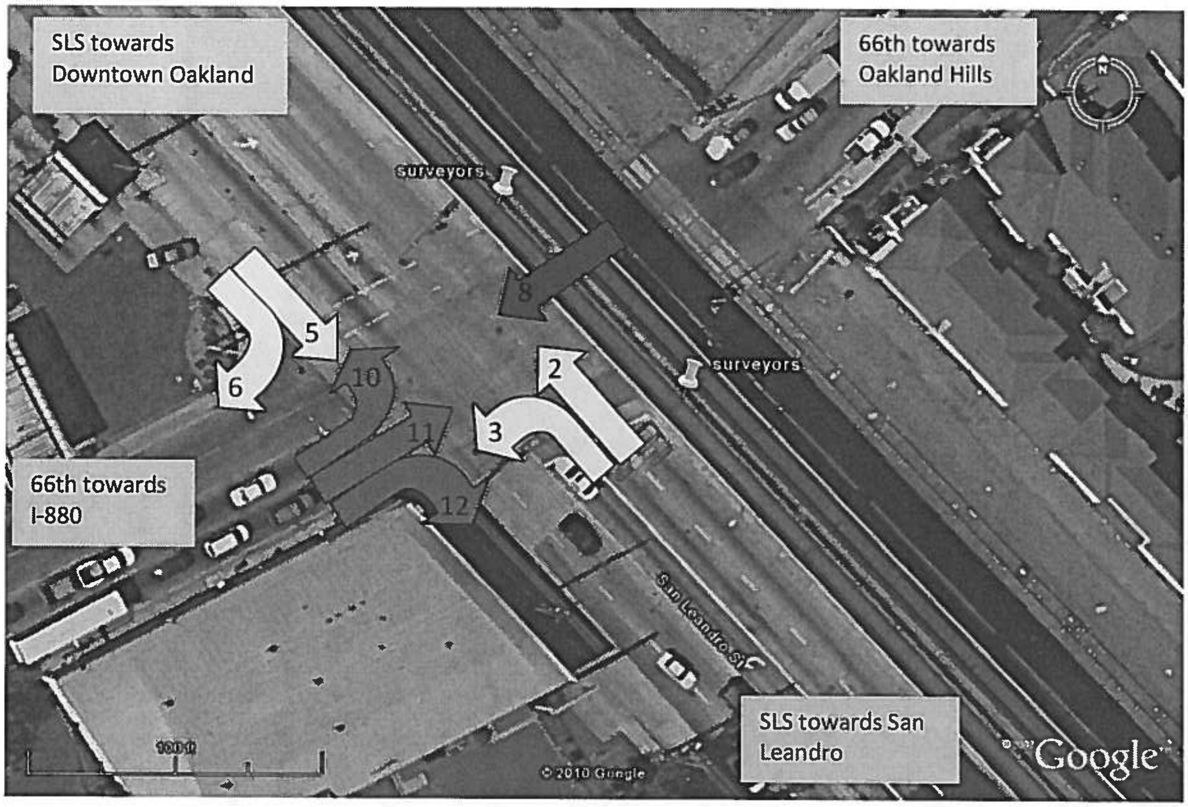


Figure 11. 66th Ave and San Leandro St. Red arrow: >400 trucks; yellow arrow: 200-400 trucks; blue arrow: 100-200 trucks; purple arrow: <100 trucks. The table below shows the truck volumes for each direction of movement. Total consists of 2 weekdays of counting, approximately 9:30-5pm. Blue line indicates the Oakland truck route.

Arrow	Direction of travel	Total Trucks
1 (not shown)	San Leandro Street (SLS) turning right on 66th towards Oakland Hills; northwest to northeast	27
2	SLS towards downtown Oakland; northwest	213
3	SLS turning left on 66th towards I-880; northwest to southeast	201
4 (not shown)	SLS towards San Leandro turning left on 66th; southeast to northeast	45
5	SLS towards San Leandro; southeast	242
6	SLS towards San Leandro turning right on 66th towards I-880; southeast to southwest	242
7 (not shown)	66th Ave turning right on SLS towards downtown; southwest to northwest	14
8	66th Ave towards I-880; southwest	89
9 (not shown)	66th Ave turning left on SLS towards San Leandro; southwest to southeast	20
10	66th Ave turning left on SLS towards downtown; northeast to northwest	189
11	66th Ave towards Oakland Hills; northeast	129
12	66th Ave turning right on SLS towards San Leandro; northeast to southeast	181

CBE counted 1592 trucks total at 66th Ave and SLS. Most trucks were using 66th Ave to I-880 from San Leandro Street (SLS), using SLS in both directions; and using 66th Ave from I-880 to turn onto SLS (Figure 11 and table above). 66th Ave is not an Oakland truck route. There is a gas station, Gateway Logistics, and Coliseum Gardens at the intersection and East Bay Truck and Auto Repair and Futures Elementary nearby.

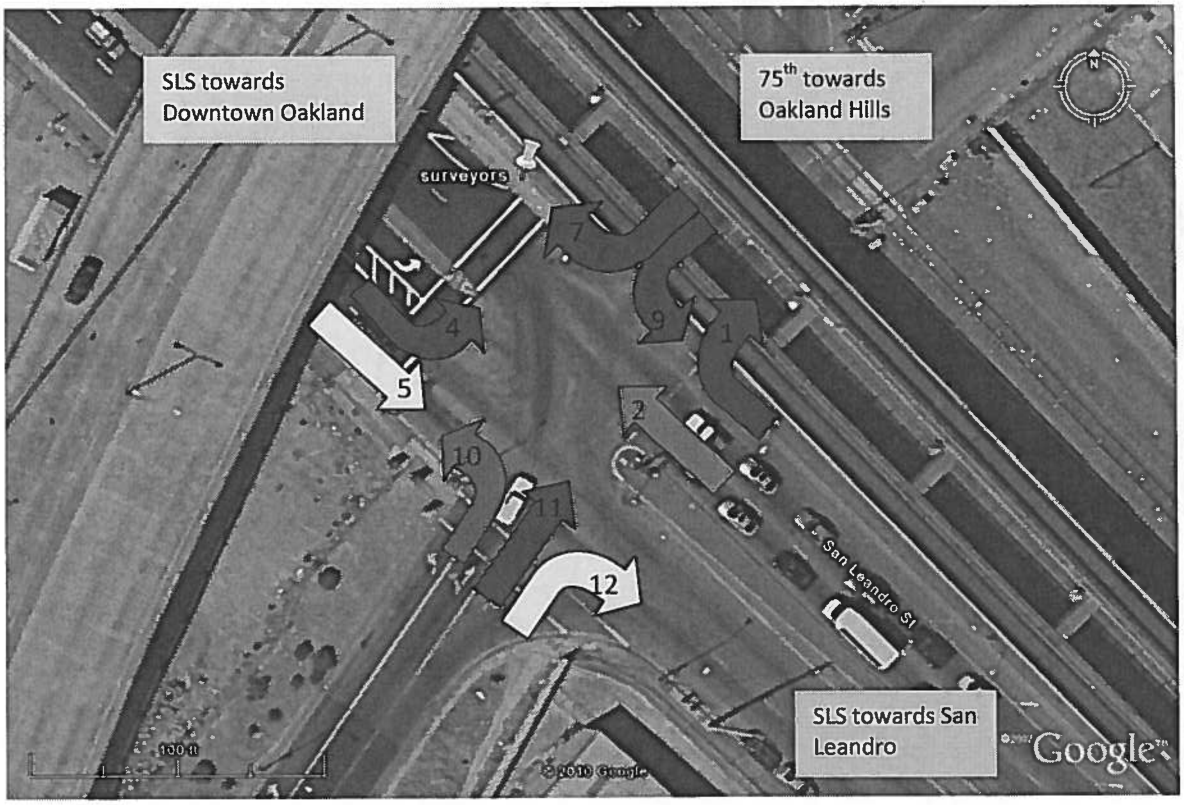


Figure 12. 75th Ave and San Leandro St. Red arrow: >400 trucks; yellow arrow: 200-400 trucks; blue arrow: 100-200 trucks; purple arrow: <100 trucks. The table below shows the truck volumes for each direction of movement. Total consists of 2 weekdays of counting, approximately 9:30-5pm. Blue line indicates the Oakland truck route.

Arrow	Direction of travel	Total Trucks
1	San Leandro Street (SLS) turning right on 75th towards Oakland Hills; northwest to northeast	52
2	SLS towards downtown Oakland; northwest	442
4	SLS towards San Leandro turning left on 75th; southeast to northeast	48
5	SLS towards San Leandro; southeast	232
7	75th Ave turning right on SLS towards downtown; southwest to northwest	95
9	75th Ave turning left on SLS towards San Leandro; southwest to southeast	62
10	75th Ave turning left on SLS towards downtown; northeast to northwest	158
11	75th Ave towards Oakland Hills; northeast	76
12	75th Ave turning right on SLS towards San Leandro; northeast to southeast	221

CBE counted 1386 trucks total at 75th Ave and San Leandro (SLS). Most trucks were using SLS towards Downtown Oakland, but many were also using SLS towards San Leandro and turning onto SLS from Hegenberger Road off-ramp in both directions (Figure 12 and table above). Many trucks taking 75th Ave towards the residential areas were going to the businesses at and around R&A Trucking and Jefferson Smurfit-Stone; many take the 73rd Ave on-ramp to get to I-880 from SLS; and the SF-Oakland Truck Stop is on SLS.

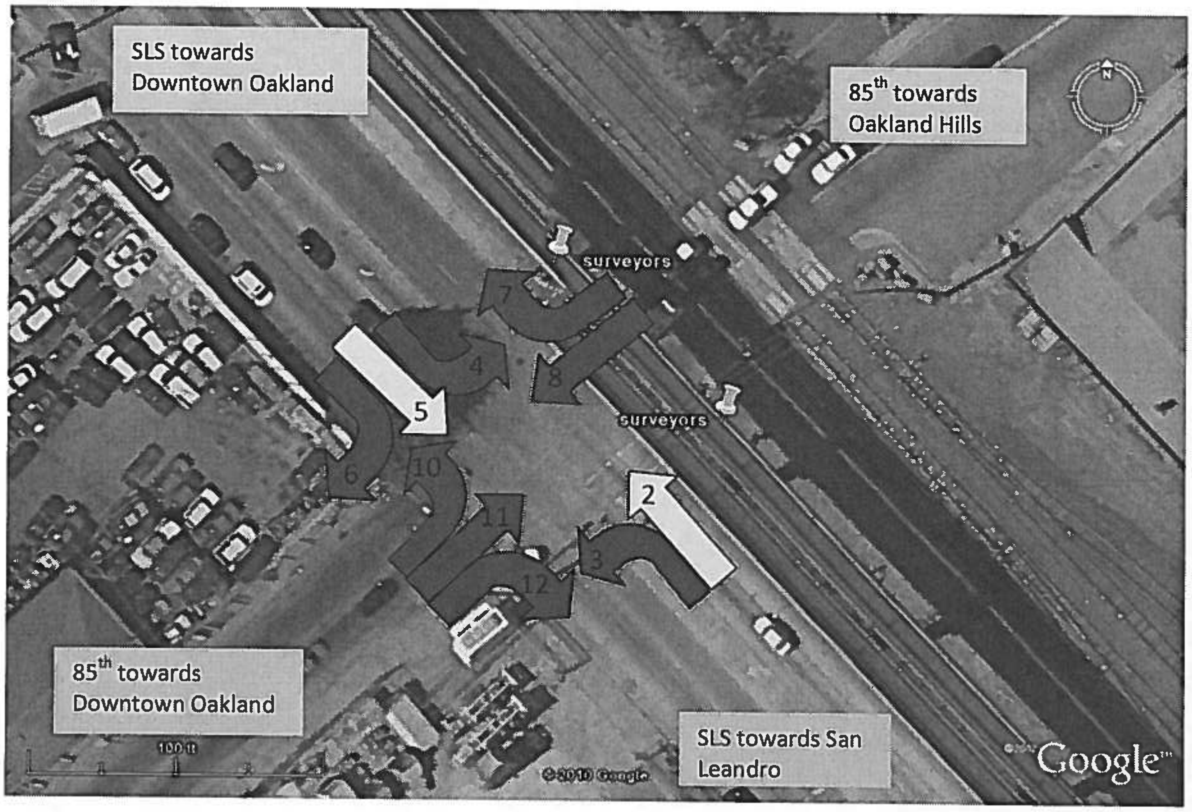


Figure 13. 85th Ave and San Leandro St. Red arrow: >400 trucks; yellow arrow: 200-400 trucks; blue arrow: 100-200 trucks; purple arrow: <100 trucks. The table below shows the truck volumes for each direction of movement. Total consists of 2 weekdays of counting, approximately 9:30-5pm. Blue line indicates truck route in Municipal Code.

Arrow	Direction of travel	Total Trucks
1 (not shown)	San Leandro Street (SLS) turning right on 85th towards Oakland Hills; northwest to northeast	45
2	SLS towards downtown Oakland; northwest	283
3	SLS turning left on 85th towards I-880; northwest to southwest	72
4	SLS towards San Leandro turning left on 85th; southeast to northeast	93
5	SLS towards San Leandro; southeast	273
6	SLS towards San Leandro turning right on 85th towards I-880; southeast to southwest	59
7	85th Ave turning right on SLS towards downtown; southwest to northwest	63
8	85th Ave towards I-880; southwest	77
9 (not shown)	85th Ave turning left on SLS towards San Leandro; southwest to southeast	43
10	85th Ave turning left on SLS towards downtown; northeast to northwest	60
11	85th Ave towards Oakland Hills; northeast	65
12	85th Ave turning right on SLS towards San Leandro; northeast to southeast	85

CBE counted 1218 trucks total at 85h Ave and SLS. Most trucks were using SLS towards Downtown Oakland and towards San Leandro and turning onto 85th Ave (Figure 13 and table above). 85th Ave connects to I-880 via Edes Ave and towards Tassafaronga Village, Benefit Cosmetics and other distribution companies, and Longview Fiber in the other direction. The SF-Oakland Truck Stop is on SLS.

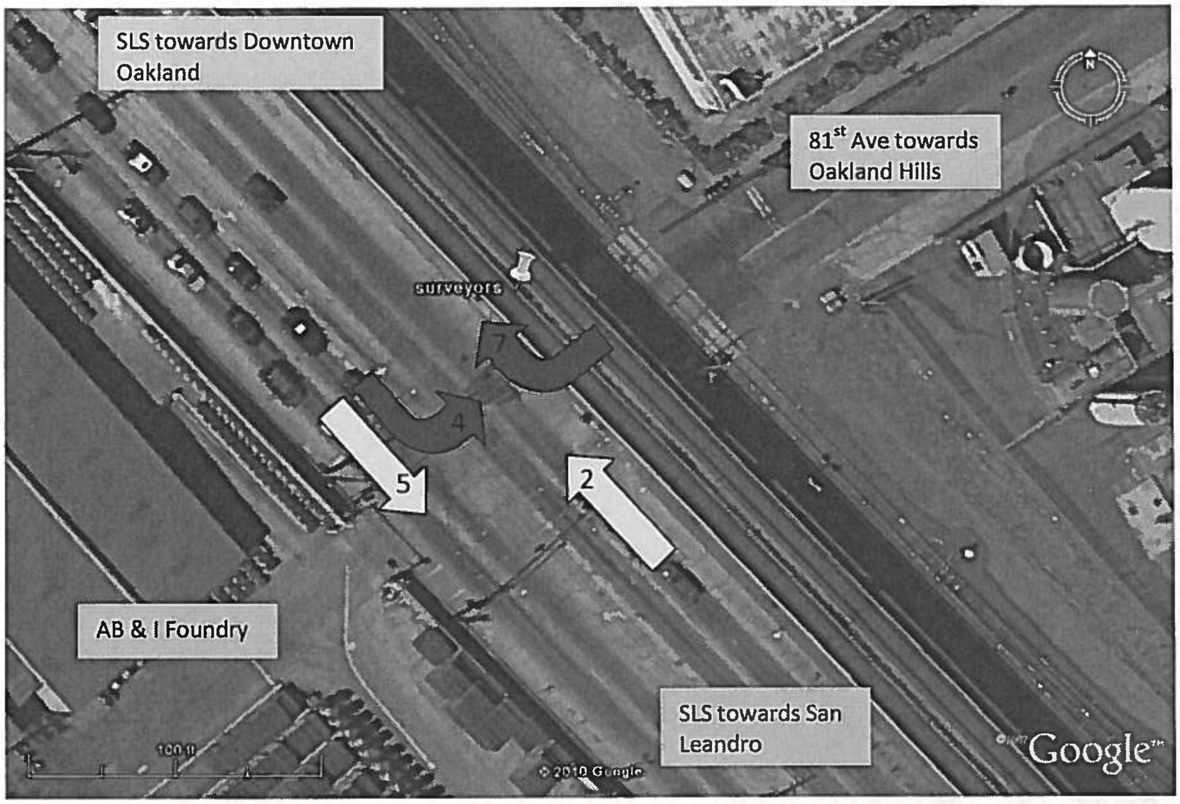


Figure 14. 81st Ave and San Leandro St. Red arrow: >400 trucks; yellow arrow: 200-400 trucks; blue arrow: 100-200 trucks; purple arrow: <100 trucks. The table below shows the truck volumes for each direction of movement. The total consists of 1 weekday morning, 9:30am-1pm and 2 weekday afternoons of counting, approximately 2-5pm. Blue line indicates the Oakland truck route.

Arrow	Direction of travel	Total Trucks
1 (not shown)	San Leandro Street (SLS) turning right on 81st towards Oakland Hills; northwest to northeast	25
2	SLS towards downtown Oakland; northwest	295
3 (not shown)	SLS turning left on 81st to AB & I Foundry; northwest to southwest	1
4	SLS towards San Leandro turning left on 81st; southeast to northeast	57
5	SLS towards San Leandro; southeast	303
6 (not shown)	SLS towards San Leandro turning right to AB & I Foundry; southeast to southwest	5
7	81st Ave turning right on SLS towards downtown; southwest to northwest	37
8 (not shown)	81st Ave towards AB&I Foundry/ I-880; southwest	0
9 (not shown)	81st Ave turning left on SLS towards San Leandro; southwest to southeast	36

CBE counted 759 trucks total at 85h Ave and SLS. This total was recorded in 1 weekday morning, not 2 like other SLS intersections. Most trucks were using SLS towards Downtown Oakland, San Leandro and to a lesser extent to and from 81st Ave (Figure 14 and table above). Former Mothers Cookies (Coliseum Industrial), Mission Clay, former Sconza Candies, and Dobake Inc. are on 81st Ave as well as ACORN Woodland Elementary, Encompass Academy, and the future Public Library. The SF-Oakland Truck Stop is on SLS.

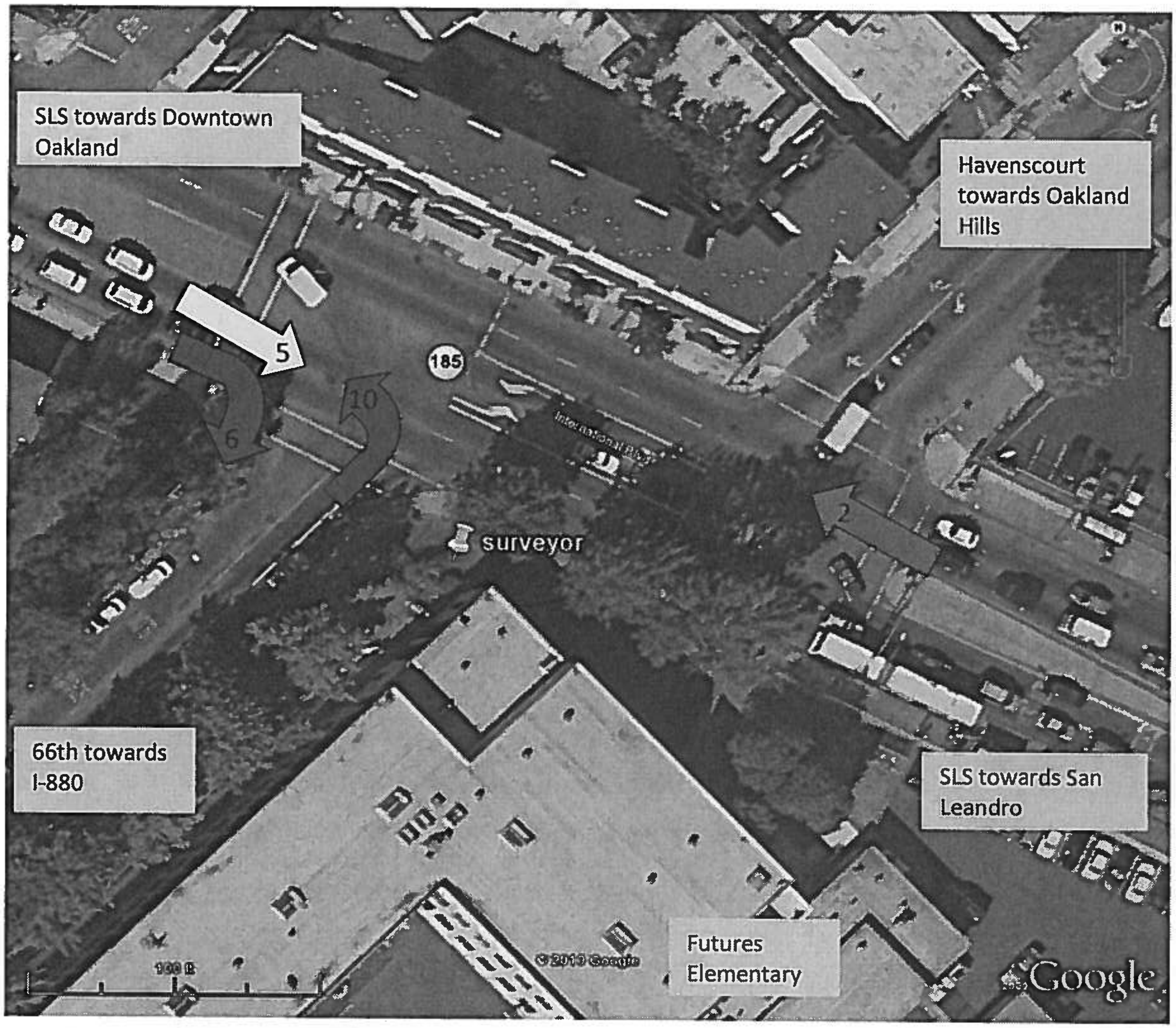


Figure 15. 66th Avenue and International Boulevard. Red arrow: >400 trucks; yellow arrow: 200-400 trucks; blue arrow: 100-200 trucks; purple arrow: <100 trucks. The table below shows the truck volumes for each direction of movement. Total consists of 2 weekdays of counting, approximately 9:30-4pm.

Arrow	Direction of travel	Total Trucks
1 (not shown)	San Leandro Street (SLS) turning right on Havenscourt towards Oakland Hills; northwest to northeast	4
2	SLS towards downtown Oakland; northwest	150
3 (not shown)	SLS turning left on 66th towards I-880; northwest to southeast	33
4 (not shown)	SLS towards San Leandro turning left on Havenscourt; southeast to northeast	5
5	SLS towards San Leandro; southeast	227
6	SLS towards San Leandro turning right on 66th towards I-880; southeast to southwest	57
7 (not shown)	Havenscourt turning right on SLS towards downtown; southwest to northwest	14
8 (not shown)	Havenscourt towards I-880; southwest	33
9 (not shown)	Havenscourt turning left on SLS towards San Leandro; southwest to southeast	16
10	66th Ave turning left on SLS towards downtown; northeast to northwest	63
11 (not shown)	66th Ave to Havenscourt towards I-580/Oakland Hills; northeast	18
12 (not shown)	66th Ave turning right on SLS towards San Leandro; northeast to southeast	26

CBE observed 646 trucks total at 66th Avenue and International Boulevard in 2 weekdays. 66th Avenue is not on the Oakland truck route and Havenscourt Boulevard is a prohibited truck route.

Figure 16. 73rd Ave and San Leandro St. Red arrow: >400 trucks; yellow arrow: 200-400 trucks; blue arrow: 100-200 trucks; purple arrow: <100 trucks. The table below shows the truck volumes for each direction of movement. Total consists of 1 weekday of counting, approximately 9:30-5pm. Blue line indicates the Oakland truck route.

Arrow	Direction of travel	Total Trucks
2	SLS towards downtown Oakland; northwest	198
3	SLS turning left on ramp to 73rd/ Hegenberger towards I-880; northwest to southwest	145
5	SLS towards San Leandro; southeast	181
6	SLS towards San Leandro turning right on ramp to 73rd/ Hegenberger towards I-880; southeast to southwest	62

CBE counted 586 trucks total at 73rd Ave and SLS in 1 weekday.

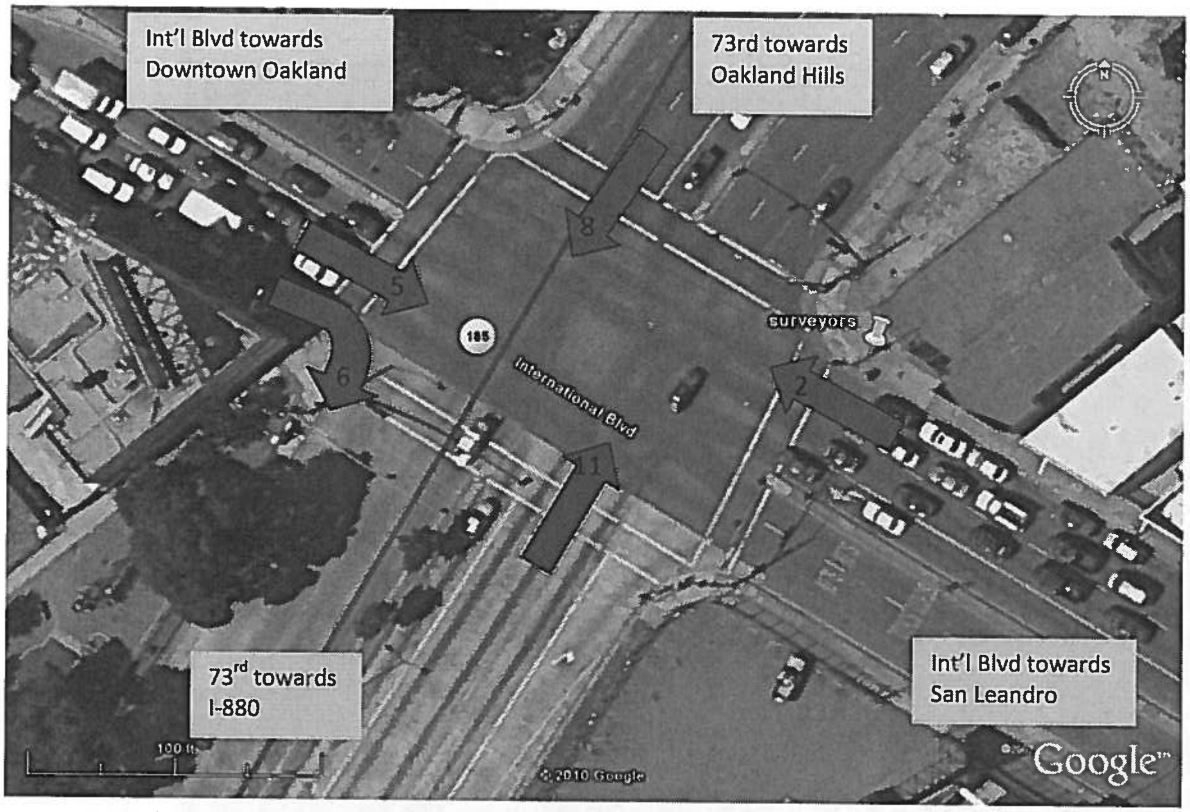


Figure 17. 73rd Ave and International Blvd. Red arrow: >400 trucks; yellow arrow: 200-400 trucks; blue arrow: 100-200 trucks; purple arrow: <100 trucks. The table below shows the truck volumes for each direction of movement. Total consists of 1 weekday afternoon of counting, approximately 1pm-5pm. Blue line indicates the Oakland truck route.

Arrow	Direction of travel	Total Trucks
1 (not shown)	San Leandro Street (SLS) turning right on 73rd towards Oakland Hills; northwest to northeast	10
2	SLS towards downtown Oakland; northwest	33
3 (not shown)	SLS turning left on 73rd towards I-880; northwest to southwest	10
4 (not shown)	SLS towards San Leandro turning left on 73rd; southeast to northeast	7
5	SLS towards San Leandro; southeast	42
6	SLS towards San Leandro turning right on 73rd towards I-880; southeast to southwest	20
7 (not shown)	73rd turning right on SLS towards downtown; southwest to northwest	3
8	73rd towards I-880; southwest	24
9 (not shown)	73rd turning left on SLS towards San Leandro; southwest to southeast	1
10 (not shown)	73rd turning left on SLS towards downtown; northeast to northwest	11
11	73rd towards Oakland Hills; northeast	16
12 (not shown)	73rd turning right on SLS towards San Leandro; northeast to southeast	2

CBE counted 179 trucks total at 73rd Avenue and International Blvd in one visit on a weekday afternoon.

Figure 18. 81st Ave and International Blvd. Red arrow: >400 trucks; yellow arrow: 200-400 trucks; blue arrow: 100-200 trucks; purple arrow: <100 trucks. The table below shows the truck volumes for each direction of movement. Total consists of 1 weekday afternoon of counting, approximately 1pm-5pm. Blue line indicates the Oakland truck route.

Arrow	Direction of travel	Total Trucks
1 (not shown)	International Blvd (Int'l) turning right on 81st towards Oakland Hills; northwest to northeast	4
2	Int'l towards downtown Oakland; northwest	90
3 (not shown)	Int'l turning left on 81st towards I-880; northwest to southwest	5
4 (not shown)	Int'l towards San Leandro turning left on 81st; southeast to northeast	8
5	Int'l towards San Leandro; southeast	90
6 (not shown)	Int'l towards San Leandro turning right on 81st towards I-880; southeast to southwest	6
7 (not shown)	81st Ave turning right on Int'l towards downtown; southwest to northwest	9
8 (not shown)	81st Ave towards I-880; southwest	1
9 (not shown)	81st Ave turning left on Int'l towards San Leandro; southwest to southeast	1
10 (not shown)	81st Ave turning left on Int'l towards downtown; northeast to northwest	1
11 (not shown)	81st Ave towards Oakland Hills; northeast	1
12 (not shown)	81st Ave turning right on Int'l towards San Leandro; northeast to southeast	6

CBE counted 222 trucks total at 81st Ave and International in one visit on a weekday afternoon.

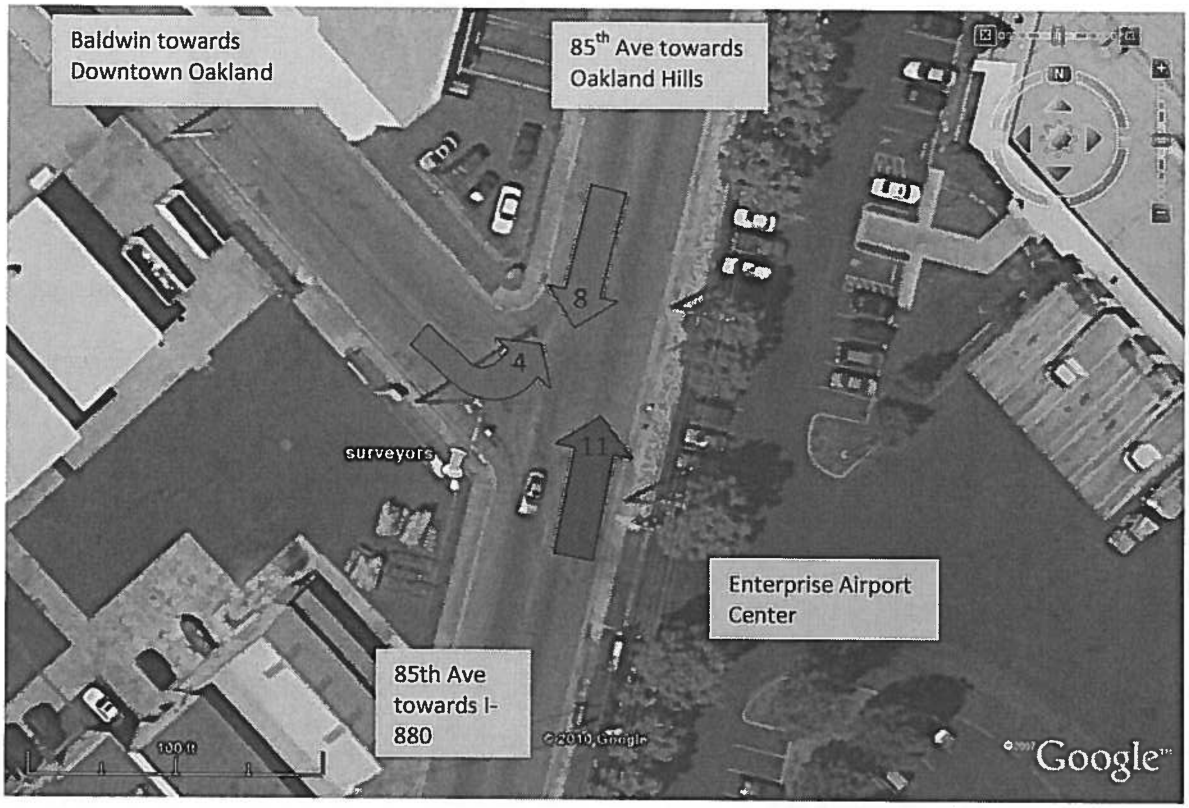


Figure 19. 85th Ave and Baldwin Ave. Red arrow: >400 trucks; yellow arrow: 200-400 trucks; blue arrow: 100-200 trucks; purple arrow: <100 trucks. The table below shows the truck volumes for each direction of movement. Total consists of 2 weekday mornings of counting, approximately 10am-1pm.

Arrow	Direction of travel	Total Trucks
1 (not shown)	From Enterprise Airport Center turning right on 85th towards Oakland Hills; northwest to northeast	4
2 (not shown)	From Enterprise Airport Center on Baldwin towards downtown Oakland; northwest	3
3 (not shown)	From Enterprise Airport Center turning left on 85th towards I-880; northwest to southwest	4
4	Baldwin towards San Leandro turning left on 85th; southeast to northeast	171
5 (not shown)	Baldwin towards San Leandro to Enterprise Airport Center; southeast	7
6 (not shown)	Baldwin towards San Leandro turning right on 85th towards I-880; southeast to southwest	37
7 (not shown)	85th Ave turning right on Baldwin towards downtown; southwest to northwest	12
8	85th Ave towards I-880; southwest	105
9 (not shown)	85th Ave turning left on Baldwin to Enterprise Airport Center; southwest to southeast	19
10 (not shown)	85th Ave turning left on Baldwin towards downtown; northeast to northwest	3
11	85th Ave towards Oakland Hills; northeast	87
12 (not shown)	85th Ave turning right on Baldwin to Enterprise Airport Center; northeast to southeast	32

CBE counted 484 trucks total at 85th Avenue and Baldwin Avenue in two visits on weekday mornings. 85th Avenue and Baldwin Avenue are not on the Oakland Truck Route.

Figure 20. 85th Ave and Edes Ave. Red arrow: >400 trucks; yellow arrow: 200-400 trucks; blue arrow: 100-200 trucks; purple arrow: <100 trucks. The table below shows the truck volumes for each direction of movement. Total consists of 2 weekday afternoons of counting, approximately 1pm-5pm.

Arrow	Direction of travel	Total Trucks
1 (not shown)	Edes Ave turning right on 85th towards Oakland Hills; northwest to northeast	22
2	Edes Ave towards downtown Oakland and I-880 ramp; northwest	35
3 (not shown)	Edes Ave turning left on 85th towards homes; northwest to southwest	0
4	Edes Ave towards San Leandro turning left on 85th; southeast to northeast	86
5	Edes Ave towards San Leandro; southeast	58
6 (not shown)	Edes Ave towards San Leandro turning right on 85th towards homes; southeast to southwest	0
7	85th Ave turning right on Edes Ave towards downtown; southwest to northwest	75
8 (not shown)	85th Ave towards homes; southwest	2
9 (not shown)	85th Ave turning left on Edes Ave towards San Leandro; southwest to southeast	33

CBE counted 311 trucks total at 85th Avenue and Edes Avenue in two visits on weekday afternoons. 85th Avenue is not on the Oakland Truck Route and Edes Avenue is a prohibited truck route.

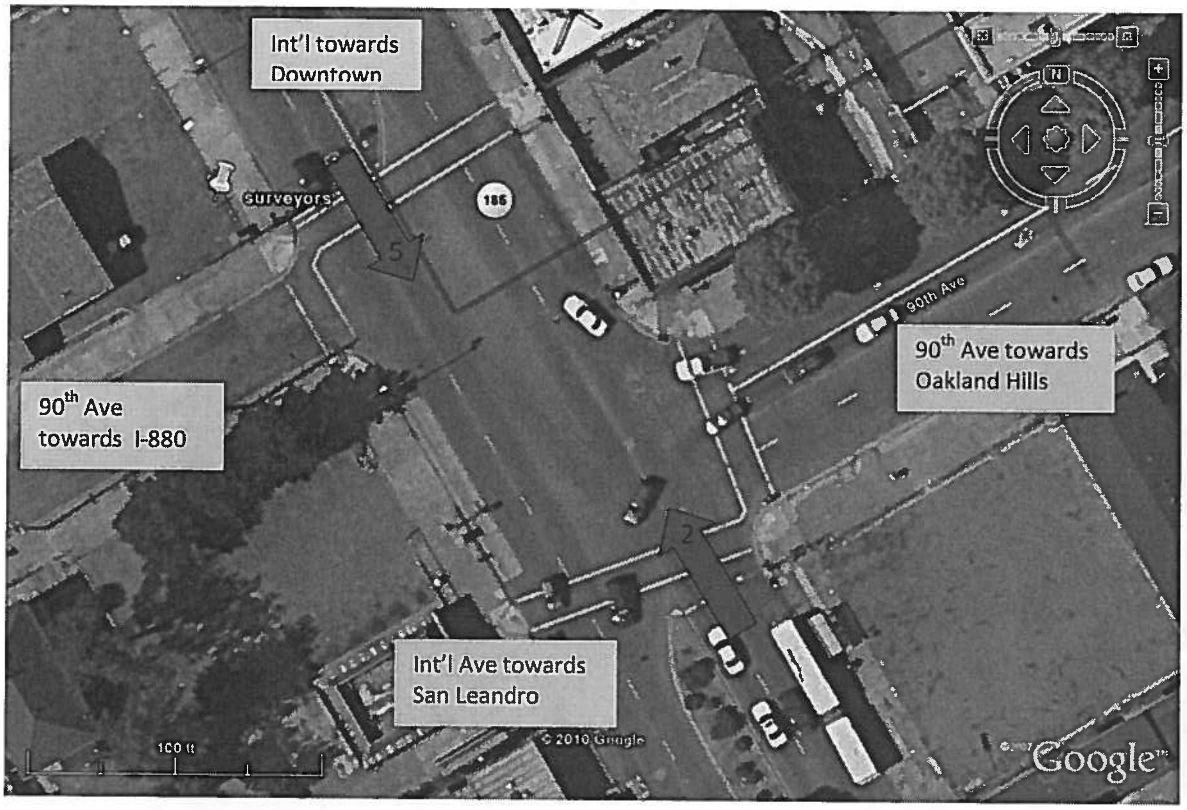


Figure 21. 90th Ave and International Blvd. Red arrow: >400 trucks; yellow arrow: 200-400 trucks; blue arrow: 100-200 trucks; purple arrow: <100 trucks. The table below shows the truck volumes for each direction of movement. Total consists of 1 weekday afternoon of counting, approximately 1pm-5pm. Blue line indicates truck route in Municipal Code.

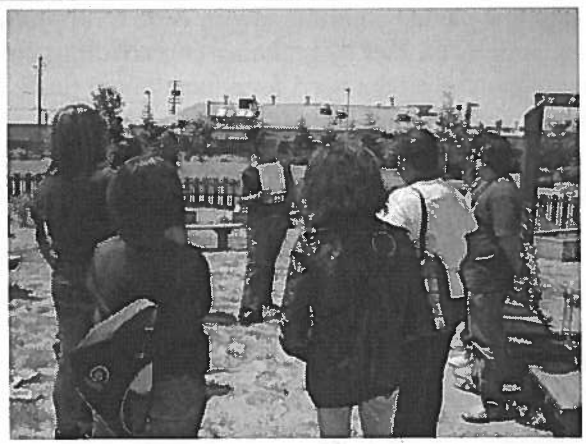
Arrow	Direction of travel	Total Trucks
1 (not shown)	San Leandro Street (SLS) turning right on 90th towards Oakland Hills; northwest to northeast	8
2	SLS towards downtown Oakland; northwest	40
3 (not shown)	SLS turning left on 90th towards I-880; northwest to southwest	0
4 (not shown)	SLS towards San Leandro turning left on 90th; southeast to northeast	3
5	SLS towards San Leandro; southeast	56
6 (not shown)	SLS towards San Leandro turning right on 90th towards I-880; southeast to southwest	1
7 (not shown)	90th Ave turning right on SLS towards downtown; southwest to northwest	4
8 (not shown)	90th Ave towards I-880; southwest	0
9 (not shown)	90th Ave turning left on SLS towards San Leandro; southwest to southeast	3
10 (not shown)	90th Ave turning left on SLS towards downtown; northeast to northwest	1
11 (not shown)	90th Ave towards Oakland Hills; northeast	1
12 (not shown)	90th Ave turning right on SLS towards San Leandro; northeast to southeast	2

CBE counted 119 trucks total at 90th Avenue and International Blvd in one visit on a weekday afternoon.

Conclusions and Solutions

This study confirms that this area of East Oakland is heavily travelled by diesel trucks. This area is a predominantly low-income, African American and Latino community of over 11,000 people[20]. Because of the close proximity to neighborhoods and the high childhood asthma rates, diesel particulate matter is a major health concern for children, seniors and other sensitive populations in this community. One study showed that proximity to local heavy traffic corridors, particularly heavy duty diesel trucks from cargo distribution centers, is possibly responsible for a significant burden of childhood asthma, and is often not recognized in traditional risk assessment.[21]

Solution 1: Examine and Revise Truck Routes and Zoning to Protect Community Health
Incompatible land uses are causes for concern not only because of the volume of trucks, but also because they are adjacent to sensitive receptors such as homes, schools, senior housing and recreation centers. The zoning laws allow major industries near residential areas. This results in pollution impacts from truck traffic in addition to pollution from operations at the stationary sources.


Nehanda, East Oakland Community Organizer, giving a tour at the Encompass Academy and ACORN Woodland Elementary garden with a magnet source, the former Sunshine Biscuits facility, in the background.

In CBE's mapping study, members found over 210 sources of pollution in the "Hegenberger Corridor," including American Brass and Iron Foundry, a truck stop, Foreign Trade Zone, Fed Ex, US Postal Service, American Storage, Jefferson-Smurfit, Longview Fiber, warehousing, truck repair businesses, and distribution centers (See Appendix, Table 5). These businesses that bring truck traffic to the area are called "magnet sources".

In the same area, CBE also identified over 45 "sensitive receptors," such as schools, churches, recreation centers, including: 66th Avenue next to Futures Elementary (and other schools); 81st Avenue next to ACORN Woodland Elementary and Encompass Academy and a future Oakland Public Library; Brookfield Recreation and Senior Center and Ira Jinkins Recreation Center; and 85th Avenue near Tassafaronga Village and Recreation Center (See Appendix, Table 6).

Since heavy-duty diesel trucks have been prohibited on the 580 freeway since the 1960's, all the streets that are entrances to the 880 freeway – 66th Avenue, Hegenberger Road, 85th Avenue, 98th

[20] Anna Yun Lee. 2008. *Cumulative Impacts in East Oakland: Findings from a community-based mapping study.* Available at: http://cbecal.org

[21] Perez, Laura; N. Künzli; E. Avol; A. Hricko; F. Lumann; E. Nicholas; F. Gilliland; J. Peters; R. McConnell. 2009. American Journal of Public Health. 99 (S3): S622-S628.

Avenue – are important arterial roads to businesses for truckers, especially Hegenberger Road and 98th Avenue. San Leandro Street and Hegenberger Road are on the City of Oakland designated truck route, but 66th Avenue, 81st Avenue, 85th Avenue, and 98th Avenue are neither on the truck route nor prohibited to trucks. 75th Avenue and 85th Avenue are also not on the route or prohibited. Edes Avenue at 85th Avenue is prohibited to trucks, but a significant number of trucks pass by, mostly to use 85th Avenue. There are also a lot of trucks at 85th Avenue and Baldwin and it is very frequently congested at this intersection.

The truck route needs to be reviewed and revised, where possible to make prohibitions that reduce impacts on residents, including congestion, safety hazards and noise impacts. The truck route should be clearly marked from the 880 freeway into the industrial area to show truckers which streets are permitted and which are prohibited. These streets should be monitored and routinely repaired.

Solution 2: Post 'No Idling' Signs and Educate Truckers

The State passed an idling law in 2008 to limit diesel engine idling to 5-minutes. Truckers can save money on fuel by reducing engine idling time, while helping improve air quality. CBE members voiced the need for education on San Leandro Street where many trucks park. Posting signage could also aid in educating community and truckers.

Solution 3: Support Community-Based Truck Studies and Ongoing Monitoring

Ongoing community-based truck studies are needed to paint an accurate picture of truck traffic over time. Though the study shows that there are a significant number of trucks in East Oakland, the number could be affected by the economy, the fluctuations in the shipping industry and time of day. So there may be fewer trucks on the road compared to other years when the state of the economy was much better, such as 2005. This may explain why freight containers were observed to be stored (or not in use) as high as six containers high by community members over the past couple of years. Conversely, there may have been more trucks on the road since July through September is when stores are stocking up for back-to-school shopping and the holidays. Based on the recent truck survey conducted at the Port of Long Beach by California Air Resources Board, cargo movement was most active during the weekday with the busiest days falling on Tuesday, Wednesday, and Thursday. Interviews with individuals working in the trucking industry indicated that truck volume highest Monday through Thursday and in the early morning from 5am – 12pm. Additional truck studies would help give a clearer picture about truck volumes in East Oakland. Furthermore, as state diesel engine regulations are implemented, there may be

CBE member and youth counting a 2-axle truck at 85th Avenue and San Leandro Street additional fluctuations in truck volumes in the future as thousands of truckers (there are about 2200 truck drivers in Oakland) retrofit or get new engines.[22]

Solution 4: Agency Reliance on Modeling Should be Adjusted to Reflect More Accurate, Neighborhood-level Data

Comparing this study to MTC modeling of 4+axle truck traffic indicates that there may be a significant underestimation of modeling of truck traffic by agencies and of the nearby residents' health risks. Consequently, agencies may be unknowingly underplaying the need to prioritize diesel reductions in East Oakland. This would pose a significant public health concern because the impacts of transportation on health occur on neighborhood levels where people live in close proximity. By supporting community-based truck studies and making agency data more readily accessible, residents can be engaged in the public process early on and bring their knowledge to the stakeholder table.

Solution 5: Inform Planning and Redevelopment Activities with Truck Impacts and Improve Community Participation

Comprehensive land use planning to address diesel truck traffic would help to protect the health of residents by reducing the overall cumulative health impacts in East Oakland. Updating the designated truck routes can be a first step. Buffers between residential areas and "magnet sources," which are businesses that attract diesel truck activity, and heavy truck corridors can help to reduce exposures. Putting in place stronger protections now for new sensitive receptors like new residential buildings by installing air filters and considering the impact of construction phase pollution from equipment, vehicles, increased truck traffic and congestion may help to prevent and mitigate the impacts of diesel pollution.

> "There are laws on the books that need to be enforced. If they were enforced, it would help clean up the air in East Oakland. If there is not an existing law, new laws need to be put in place to protect people's health."
>
> -- Myrtle Washington, CBE member

Developing a process to hear and address community concerns that would give residents a direct line to the City to address their concerns is an important aspect to enforcement. Currently, there is not a clear process to make complaints about truck traffic and businesses with lots of trucks or to make a safety complaint about height limits on Port container storage next to Pulte homes. The City of Oakland can take leadership in investing in low-emissions diesel vehicles for the City's fleet of trucks and equipment to meet "clean construction" standards or low-emissions standards. It can also pass a clean construction ordinance like other cities such as San Francisco.

Community input, education to truck drivers, adequate signage, clear accountability, equitable distribution of pollution and enforcement of idling regulations and truck routes are necessary for ensuring the effectiveness of these policies. This is a pollution source that needs more attention and regulation as plans for development and climate protection are being developed.

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22 For more information about the state's requirements for diesel vehicles: http://www.arb.ca.gov/msprog/truckstop/truckstop.htm

Appendix

Operating Protocol

Truck Counting.

1. Counters should be prepared to be in the field counting trucks for 4-hour shifts.
2. Meeting place: Tassafaronga Recreation Center, 975 - 85th Ave, Oakland, CA.
3. "Home Base" for bathroom and post-count meeting place: Tassafaronga Recreation Center, 975 - 85th Ave.
4. Fill out truck survey log sheets, including location and direction of traffic counting, counters' name, date, day of week, and start time.
5. At each intersection, there will be at least one team of two people, one log sheet per team. The team will observe and use the following information to tally on the log sheets every truck passing through their designated intersection:
    a. the direction the truck driver is going as it approaches the intersection using the number system;
    b. the movement of those trucks – left turn, right turn or straight depending on which direction the truck is coming from using the number system;
    c. counting the number of axles on the trucks that pass by – Port Container truck, Port Chassis Truck, 6 or more axles, 5-axle, 4-axle, 3-axle bobtail, 3-axles other types of trucks, and 2-axle trucks;
    d. 10 unique license plate numbers per hour and direction using the number system;
    e. and other notes and observations.
6. In one day, each team will complete one 4-hour shift of counting and monitoring trucks. At the end of each shift, the participants will ensure they filled out the name, date, time, and location properly on all data sheets, tally and turn-in to survey coordinators or site supervisor.
7. Busy intersections will have 2 teams, each team watching two directions of traffic, i.e. one team will count north-south and the other team will count east-west traffic. The exception is 81st Ave @ San Leandro St, where the team will observe 3-way traffic.
8. Keep observations, like of parked trucks, places where trucks are idling, damaged roads, etc.
9. Frequency. For major streets that enter/exit the freeway, counting locations will be monitored for 2-full weekdays and 1 weekend if time permits. Because diesel trucks are a health and safety hazard, shifts will be 4 hours and no one can exceed 4 hours of counting per day. Shifts will consist of mornings (9:30am-1:30pm) and afternoons (1-5pm).
10. Quality control: CBE staff and study coordinator will oversee truck study data collectors to ensure consistency. If there is not enough CBE staff to have one CBE staff person at each intersection, CBE staff will float between counting stations spending one hour with each team of truck study data collectors.

Truck Idling Monitoring

1. Monitors will count number of trucks parked and record license plate numbers.
2. Monitors will also use watches to monitor idling start and end time.

Data Analysis

1. At the end of each shift, teams will total the tallies and mark log sheets with totals.

2. CBE will double-check totals and collect all log sheets. CBE will create spreadsheets and analyze data for total counts, daily counts, weekly counts, counts by truck type, volume by intersection, time-of-day analysis, day-of-week analysis, and a comparison utilization of City of Oakland designated truck routes versus non-truck routes.
3. CBE will analyze truck idling times and survey data collected from truck-based businesses that participate in survey.
4. CBE will collect license plate information and send to staff at the BAAQMD. Staff at the BAAQMD will assist with accessing Department of Motor Vehicle data for truck ages.

Materials

- Safety vests
- Ear plugs
- Dust masks
- Disposable or digital cameras
- Clip boards
- Mechanical pencils
- Program business cards with contact info
- Rental van or other transportation
- ID Cards
- Truck study info card
- Diesel truck factsheet

Survey teams are recommended to arrive at their designated survey locations 15 minutes earlier than the actual survey start hour. Prior to conducting the survey, teams should locate the **MOST SAFE** area that is the closest to their designated survey locations and that offers the best viewing (CBE has already identified these locations). If teams are not able to find a safe area to conduct the survey, teams should contact the survey manager such that an alternative survey location may be assigned. If an event occurs that impacts the survey (e.g. an accident blocking traffic), the teams should contact the study coordinator and make note of the incident as well as the time period it impacts on the log sheets. If an emergency or safety issue occurs, the study coordinator will follow the safety plan to ensure the participants' safety.

Things to Remember

The following policies are meant to keep participants safe, comfortable, reduce attention from people passing by, and ensure we are always able to continuously count trucks. Non-compliance with these policies may mean the field supervisor and/or coordinators have to send participants home.

Dress Code

- Wear clothes that can get dirty and dusty
- Must wear provided safety vest while on duty
- You will need a hat
- Only wear closed-toed shoes <u>with</u> shoe strings
- No shorts or skirts above the knees

Electronics Policy

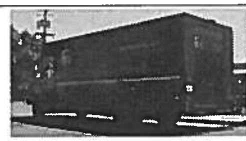
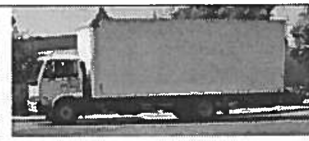
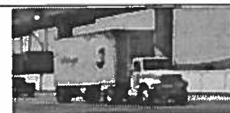
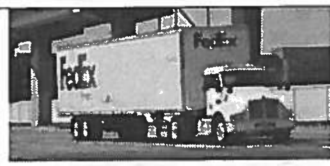
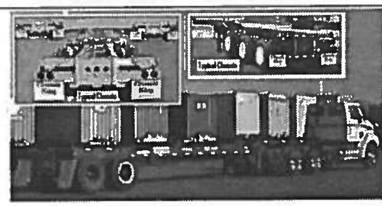
- No un-needed telephone conversations while on duty. You may only use it to contact the field supervisor and coordinators for bathroom breaks and other needs and for emergencies ONLY
- No text-messaging or music listening that interrupts your ability to see and count trucks

Safety

- Make sure you are set-up with your chair a few feet from the curb since trucks often ride up onto the curbs. The Site Supervisor and/or Study Coordinators will designate safest locations to sit at each intersection.
- If you are approached by people who want to know more, try to not talk to them. Instead, give them the truck study info sheet and the diesel truck factsheet. There is contact information on both of them. Because you are continuously counting, you cannot talk. Talking will distract you and you may miss a truck driving by.

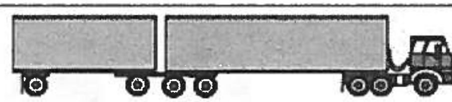
Setting up and take down

- Check log sheets and make sure you labeled your name, date, time, accurate location. Turn-in to survey coordinators or site supervisor. They will give you the "OK" to leave
- Clear the area where you are posted. You should not leave anything behind, including trash.
- Turn-in all supplies or equipment at the work shift.

Table 4. Truck Classification by number of axles and type[23]			
No. of Axles	Type of truck	Examples	Notes
2-axles	Box truck, courier van, small fire trucks	 	Two-axle trucks have two tires when viewed from the side. These include box delivery trucks, courier vans, UPS and Fed Ex trucks, small fire trucks and paratransit buses. For this study, we are not counting AC Transit buses.
3-axles	Bobtail Port truck	 	Three-axle trucks can be divided into two categories – Port trucks and Non-Port trucks – and teams will differentiate between these[24]. The 3-axle bobtail trucks are Port trucks and they are 3-axle tractors that do not have the trailer attached.
	Non-Port: Cement trucks, Package delivery trucks, Moving van trucks	  	Non-Port 3-axle trucks include cement trucks, large delivery vans, moving vans, and large fire trucks.
4-axles	Delivery trucks, Car-carrier, Tractor/ trailer		Four-axle trucks are Non-Port trucks and include car-carriers, flatbed chassis trucks, and tractor / trailer type trucks. These are large Fed Ex or UPS trucks, grocery store trucks, like Safeway or Pac 'N Save trucks. They have smooth containers without vertical ridges/ ribbing.
5-axles	I-Beam Chassis Port truck		Five-axle trucks can also be divided into Port and Non-Port trucks and Port trucks can be divided into 5-axle I-beam chassis and 5-axle container trucks. Port I-beam Chassis Trucks are tractors with an attached I-shaped (when viewed from above) chassis trailer that are used to secure either a 20-foot or 40-foot ribbed containers that are unloaded from cargo ships. The trailer has a long beam in the middle with two perpendicular beams at the top and bottom, giving it the shape of an "I" when viewed from above. The I-Beams Chassis is typically black or orange in color and makes the Port containers appear elevated from the side view.

[23] Adapted from *Protocol for the West Oakland Diesel Truck Survey*. March 2008. Sonoma Technology, Inc. and the Bay Area Air Quality Management District.

[24] With one caveat: A small portion of container trucks are attributed to local businesses that may not necessarily be Port-related and destined for transport via ship or train.

	Port container truck	 	The most common type of drayage trucks are Port Container Trucks. The container trucks are typically five axles with a container loaded on an I-Beam chassis trailer. An easy cue that a truck is a port container truck is the 20 feet or 40 feet long container with the characteristic vertical ribbing, although there are a few exceptions when a Port container truck will have a smooth container. These containers usually have vertical ridges. They are also often labeled with a shipping company name, such as: APL, CSX, China Shipping, Cosco, Evergreen, Geseaco, Hamburg Sud, Hanjin, Hapag-Lloyd, Hyundai, Ivara, "K" Line, MAERSK and Maersk Sea Land, Matson, Mitsui O.S.K. Lines, MOL, NYK log, OOCL, P & K, Pivan, TEX, TRITON, Wan Hai, and Yang Ming.
	Non-Port: Flatbed chassis truck, container truck, gasoline tanker truck	 	Non-Port 5-axle trucks appear as a flatbed chassis or with a smooth container stacked on top of a flatbed chassis (as opposed to the I-beam). The Non-Port Flatbed Chassis Truck does not have the "I" shape; instead these have a flatbed or platform to support a variety of materials. Non-Port Container Trucks do not have the typical ribbing that a Port container truck has. Non-Port Container Trucks are typically 53 feet long with the container built on the chassis as a single unit.
6 or more axles	Tandem tractor/ trailer		Six-axle trucks are rare at these sites. These may be a Port truck with two Port containers trailing behind, or a construction truck used for carrying large quantities of gravel.

CBE East Oakland Diesel Truck and Bus Classification Log Sheets

(Adapted from *Protocol for the West Oakland Diesel Truck Survey*)

Survey Date (MM/DD/Year): ____________________

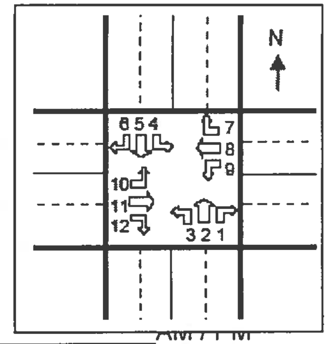
Surveyor: ____________________

Location:

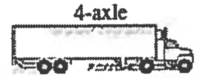
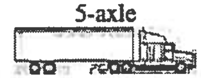
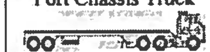
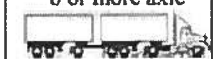
Cross Street:

Direction: North-South East-West

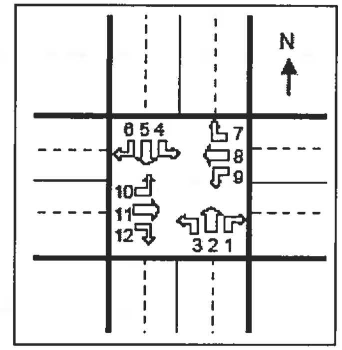
Label the diagram to the right with street names and label your location with a star



Day of the Week (circle one): Mon Tue Wed Thu Fri Sat Start Time: ____________AM / PM End Time: ____________AM / PM

Circle direction entering inter-section	Label direction leaving inter-section	2-axle 	3-axle (other) 	3-axle Bobtail  (Port truck)	4-axle 	5-axle  (Flatbed Chassis/ Non-Port truck)	5-axle Port Container Truck 	5-axle I-Beam Chassis/Empty Port Chassis Truck 	6 or more axle 
North or West									
South or East									

Page ____ of ____



CBE East Oakland Diesel Truck and Bus License Plate Log Sheets

(Adapted from *Protocol for the West Oakland Diesel Truck Survey*)

Survey Date (MM/DD/Year): ____________________ Surveyor: ____________________

Location: ____________________

Day of the Week (circle one): Mon Tue Wed Thu Fri Sat

Start Time: ____________AM / PM End Time: ____________AM / PM

Instructions:

- Record about 10 license plate numbers and direction (**using the numbering system in the diagram**) per hour while counting trucks
- Record only license number of the front (tractor portion) of each truck
- Draw a line through zeros so that they are not confused for letters.

1.)	15.)	29.)	43.)
2.)	16.)	30.)	44.)
3.)	17.)	31.)	45.)
4.)	18.)	32.)	46.)
5.)	19.)	33.)	47.)
6.)	20.)	34.)	48.)
7.)	21.)	35.)	49.)
8.)	22.)	36.)	50.)
9.)	23.)	37.)	51.)
10.)	24.)	38.)	52.)
11.)	25.)	39.)	53.)
12.)	26.)	40.)	54.)
13.)	27.)	41.)	55.)
14.)	28.)	42.)	56.)

Page ____ of ____

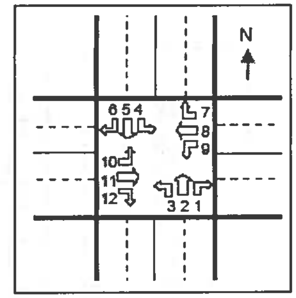
CBE East Oakland Diesel Truck and Bus Survey Log Sheets–**Three-way Intersection**
(Adapted from *Protocol for the West Oakland Diesel Truck Survey*)

Location:

Cross Street:

Direction: North-South East-West

Label the diagram to the right with street names and label your location with a star



Survey Date (MM/DD/Year): ____________________

Surveyor: ____________________

Day of the Week (circle one): Mon Tue Wed Thu Fri Sat Start Time: __________AM / PM End Time: __________AM / PM

Label direction entering inter-section	Label direction leaving inter-section	2-axle	3-axle (other)	3-axle Bobtail (Port truck)	4-axle	5-axle (Flatbed or Flatbed Chassis/ Non-Port truck)	5-axle Port Container Truck	5-axle I-Beam Chassis/Empty Port Chassis Truck	6 or more axle

Page ____ of ____

Table 5. Logistics and Truck-Attracting Businesses from CBE Community-Based Mapping Study[25]				
Facility Name	**Address**	**Zip code**	**Intersection**	**Notes and Concerns**
Wells Industrial Complex	850 92nd Ave	94621	San Leandro St and 92nd Ave	Durham Schools Pacer Cartage Ace Iron Ink C.R. Windows Dairy Fresh Fast Lane (intermodal)
? Unmarked active facility	1067 77th Ave.	94621	Hamilton St. and 77th Ave.	Trucks_ non-trailer truck loading bay.
No name	955 87th Ave	94621	87th Ave and E St	Food import
R & A Trucking	1050 77th Ave	94621	77th Ave and Rudsdale St	Distribution; truck repair; huge. Takes up 1 block of 77th Ave.
Corn Joes Appliances	1361 92nd Ave	94621	1 block off International Ave	Big Riggs deliver appliances.
UPS/ Fed-Ex_ DHL	9525 96th Ave	94621	96th Ave and International Blvd	Large building; pick-up/ parking lot (on the corner).
Post office	9201 International Blvd	94621	92nd Ave and International Blvd	Postal service department.
Benefit	725 Amelia St.	94621	Amelia St @ 85th Ave	Receiving and shipping docks for diesel trucks.
Shed Works/D & J International	8402 Amelia St.	94621	Amelia St @ 85th Ave	Office_ shipping and receiving dock for diesel trucks.
The Community Closet Thrift Store	8430 Amelia St.	94621	Amelia St @ 85th Ave	Shipping and receiving.
Mothers Cookies	836 81st Ave.	94621	81st Ave. and San Leandro St.	Possibly unoccupied. Sub-divided industrial space.
No name	860 81st Ave.	94621	81st Ave. and San Leandro St.	Shipping and receiving.
Coliseum Industrial	910 81st Ave.	94621	81st Ave. and San Leandro St.	One space leased to Mercedes Benz Workshop. Non-trailer truck traffic.
Dean's Services	940 81st Ave.	94621	Rudsdale St. and 81st Ave.	Diesel truck traffic; noxious odors in the air. Logistics services for the food industry
GY	91005 G Street	94621	G St and 88th Ave?	Is this supposed to be 9015 G St? If so, it's a warehouse; general industrial/ transp; M-30
88th Ave Complex Rental	940 88th Ave	94621	88th Ave and G St	Trucks
No name	8541 Amelia St	94621	Amelia St and 85th Ave	Lots of trucks parked
Bay Area Warehouse Co	8707 San Leandro St	94621	San Leandro St and 85th Ave	
US Imports	9009 San Leandro St	94621	San Leandro St and 92nd Ave	
Studios	9029 San Leandro St	94621	San Leandro St and 92nd Ave	Warehouse; General Industrial/ Transp; M-40
Oakland Foreign Trade Zone/ PAC AM	9401 San Leandro St	94621	San Leandro St and Industrial St	
Sayfee Hardware Trucks & Trailer Rentals	10226 International Blvd	94621	Intl Blvd and 102nd Ave	568-1137
Penn Logistics	691 85th Ave	94621	85th Ave and Railroad Ave	High concern. Since 7/2007. Diesel truck traffic at 85th and Railroad blocking the street and idling.
AMS	700 Blenheim St	94621	Blenheim St and Pearmain St	High concern. 925-288-9606; warehousing
Golden Gate Truck Co.	8200 Baldwin St	94621	Baldwin St and McClary Ave	
Service West (Furniture Installation)	9201 San Leandro St	94621	San Leandro St and 92nd Ave	430-1752; office furniture industry--warehousing, commercial moving services
Experience Autobody and Paint/ Micki's Towing and Storage	973 86th Ave.	94621	E St. and 86th Ave.	Diesel towing trucks have a driveway across the street from Tassafaronga. Headstart on 85th Ave.
A & B Auto Co	87117 G Street	94621	88th Ave and G St	Across from a lot of diesel truck cabs
Redwood Coast Petroleum Gas and Truck Stop	8119 San Leandro St	94621	San Leandro St and 81st Ave	Gas station, truck wash and repair, store, propane
Lane Stanton Vance Lumber Co.	745 Amelia St.	94621	Amelia St @ 8S th Ave	Many businesses Receiving and shipping docks for diesel trucks.
Kares Construction?	810 81st Ave.	94621	81st Ave. and San Leandro St.	Industrial site. SAIA.com truck logo entering the company property.
AJW Construction_ Paving & Grading	966 81st Ave.	94621	Rudsdale St. and 81st Ave.	Materials storage; truck traffic; noxious odors in the air.

[25] Anna Yun Lee. 2008. *Cumulative Impacts in East Oakland: Findings from a community-based mapping study.* Available at: http://cbecal.org

Smurfit-Stone Oakland Recycling Plant	800 77th Ave	94621	77th Ave at San Leandro St.	Papers recycling; trucks line around the corner; idling.
Accent Umbrellas	950 77th Ave.	94621	Hawley St. and 77th Ave.	One loading dock for non-trailer trucks.
Ismy's Towing Company	8630 87th Ave	94621	87th Ave and E St	Towing and storage, 24 hrs.

Table 6. Sensitive Receptors Identified from CBE Community-Based Mapping Study [26] and Truck Study

Name	Address	Zip Code	Intersection	Notes
Allen Temple Community Outreach Center	709 International Blvd	94621	72nd Ave and International Blvd	Community outreach services.
Bethlehem Family Ministry	8721 International Blvd	94621	87th Ave and International Blvd	Church.
United Outreach Church	1200 75th Ave	94621	75th Ave and Rudsdale St	Church.
Kingdom Hall Jehovah Witness	1057 98th Ave	94621	98th Ave and E St	Church
Allen Temple Baptist Church	8501 International Blvd	94621	International Blvd and 85th -86th Ave	Church.
Lily of the Valley	1010 91st Ave	94621	91st Ave and E St	Church
Cosmopolitan Baptist Church	988 85th Ave.	94621	85th Ave and E St	Church 569-6441
Tassafaronga Head Start	975 85th Ave.	94621	E St. and 85th Ave.	
Tassafaronga Recreation Center	971 85th Ave.	94621	E St. and 85th Ave.	City of Oakland_ Parks and Recreation Department.
Allen Temple Children Center	1285 86th Ave	94621	International Blvd and 86th Ave	Child care center.
Highland Elementary	8621 A Street	94621	Between 84th/ 85th Ave on A St	School.
ACORN Elementary	1025 81st Ave	94621	Between 80th/ 81st Ave	School.
Riley Chapel CME Church	1302 80th Ave	94621	On 80th Ave at the corner of B St	Church.
Kiddieland Childcare Center	1268 78th Ave	94621	Middle of block and Rudsdale St	Dirty-looking center that looks cluttered.
East Oakland Health Care Center	7450 International Blvd	94621	74th Ave and International Blvd	Two buildings on the left side of International Blvd.
City of Oakland Head Start	9202 International Blvd	94621	92nd Ave and International Blvd	Head start for children.
Community Service Ministry	9440 International Blvd	94621	95th Ave and International Blvd	Community service organization.
Mt Zion Prayer Tower Mission	8615 International Blvd	94621	96th Ave and International Blvd	Church.
Abundant New Life Generation	9711 International Blvd	94621	97th Ave and International Blvd	Church.
Pentecostal Church Latino	8909 International Blvd	94621	89th Ave and International Blvd	Church.
Resurrection Concord Christian Church	8901 International Blvd	94621	89th Ave and International Blvd	Church.
House of Truth	8835 International Blvd	94621	89th Ave and International Blvd	Church.
New Hope Church of God in Christ	9248 International Blvd	94621	89th Ave and International Blvd	Church.
EnCompass Academy	1025 81st Ave.	94621	Rudsdale St. and 81st Ave.	Elementary-age school; noxious odors in the air.
Allen Temple Gardens	10121 International Blvd	94621	Intl Blvd and 101st Ave	383-9190; Senior Housing
Foothill Square Early Head Start	10700 MacArthur Blvd	94621	MacArthur Blvd and 107th Ave	553-9926
Oland Daycare Services	10938 Reposo Drive	94621	Reposo Dr and Bergedo Dr	562-6635
1234 Tots Family Day Care	1234 82nd Ave	94621	82nd Ave and A St	562-6200
Show Me Love Daycare	1279 79th Ave	94621	79th Ave and International Blvd	777-2983
Allen Temple Baptist Church Nursery	1321 86th Ave	94621	86th Ave and A St	562-8421
Barbara Jackson Daycare	1449 74th Ave	94621	74th Ave and International Blvd	638-4560
Little People	1535 92nd Ave	94621	92nd Ave and Holly St	569-2208
Parent Child Development Center	1643 90th Ave	94621	90th Ave and Walnut St	635-1690

26 Anna Yun Lee. 2008. *Cumulative Impacts in East Oakland: Findings from a community-based mapping study*. Available at: http://cbecal.org

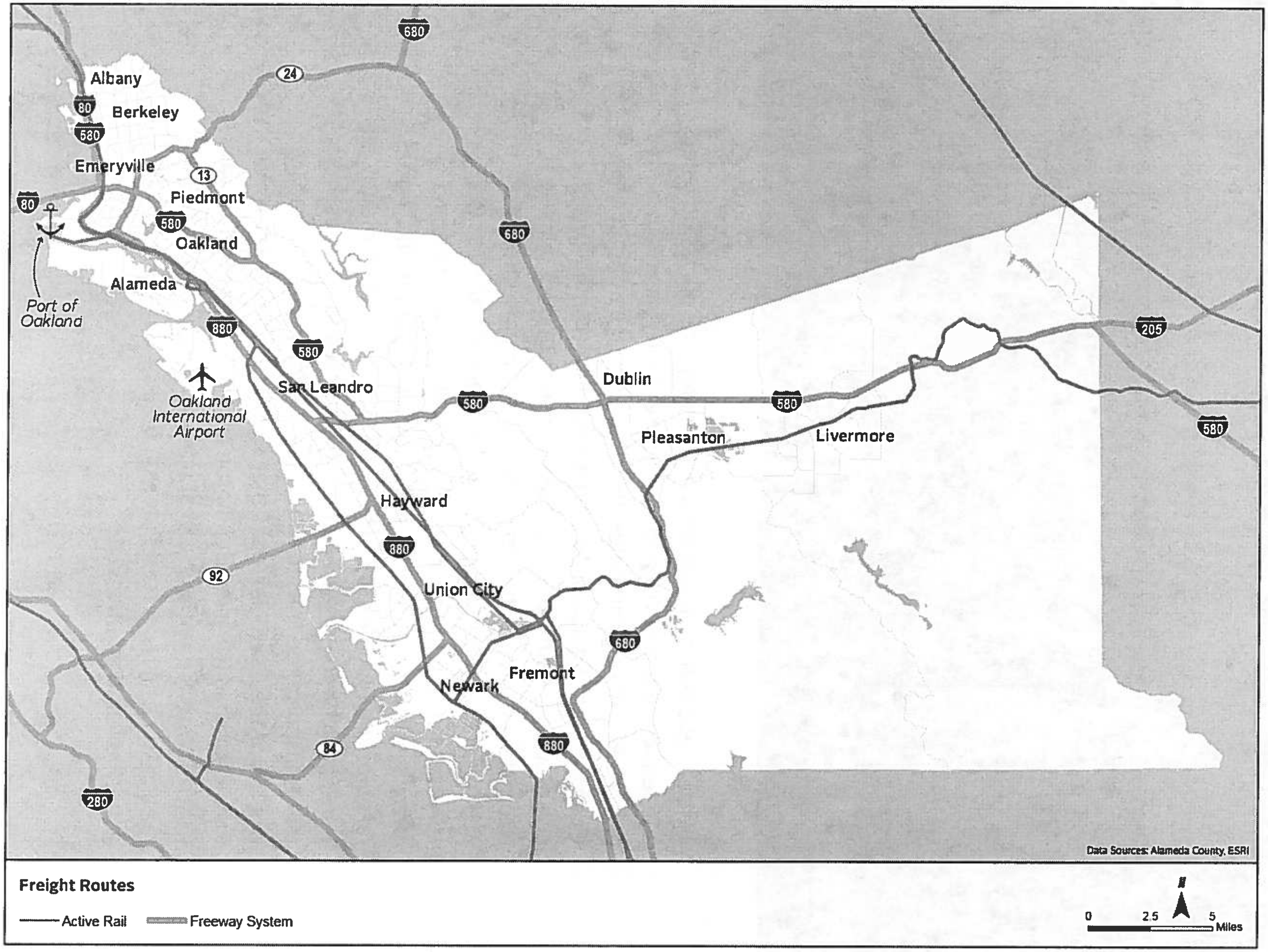
Rosalie's Little Sunshine Day Care	2017 83rd Ave	94621	83rd Ave and Olive St	639-7512
Loni's Day Care	2628 90th Ave	94621	90th Ave and Thermal St	638-7334
House of Many Children	284 Cairo Rd	94621	Cairo Rd and Coral Rd	635-1376
Little Angels	2975 Parker Ave	94621	Parker Ave and Outlook Ave	632-2028
Crumb Snatchers	7426 Hillmont Drive	94621	Hillmont Dr and 75th Ave	568-8038
Arroyo Viejo Recreation Center	7701 Krause Ave	94621	Krause Ave and 77th Ave	615-5755
Color Me Children Preschool & Kindergarten	8115 Fontaine St	94621	Fontaine St and Holmes Ave	430-1322
Lossieland Preschool	8130 Plymouth St	94621	Plymouth St and 81st Ave	569-8150
Allen Temple Arms	8135 International Blvd	94621	Intl Blvd and 81st Ave	562-2771; Senior Housing
East Oakland Youth Development Center	8200 International Blvd	94621	International Blvd and 82nd Ave	569-8088
Ossian Carr Boys and Girls Club	8530 International Blvd	94621	International Blvd and 85th	638-1532
YMCA of the East Bay	8711 MacArthur Blvd	94621	MacArthur Blvd and 88th Ave	635-1534
Kids of the Kingdom	8800 Fontaine St	94621	Fontaine St and Crest Ave	569-0900
Ira Jinkins Recreation Center	9175 Edes Ave	94621	Edes Ave and Jones Ave	615-5959
Verdese Carter Park	9600 Sunnyside St	94621	Sunnyside St and 96th Ave	615-5758
Futures Elementary, Roots, Coliseum College Prep and other schools	6701 International Blvd	94621	66th Ave and International Blvd	school
Acts Full Gospel Church of God In Christ and Academy	1034 66th Ave	94621	66th Ave and International Blvd	Church and school
Greenman Field	66th Ave	94621	66th Ave and International Blvd	Recreation area/ open space
Brookfield Village Elementary School	401 Jones Avenue	94603	Jones and Edes Ave	School
Brookfield Branch Library	9255 Edes Ave	94603	Jones and Edes Ave	Library

CHAPTER 9. GOODS MOVEMENT

Efficient goods movement enhances the region's competitiveness and reduces the costs of goods and services in Alameda County and the Bay Area. It facilitates both domestic and international trade by providing access to markets for local manufacturing, and providing connections to major consumer goods suppliers. International trade is the fastest growing component of local and regional goods movements, with major gateways located in Alameda County such as the Port of Oakland and Oakland International Airport. Trucking moves most freight traffic, a wide range of commodities, and serves all freight markets. Rail provides transportation for long-haul bulk movements and provides important transportation links to the Port of Oakland, which is serviced by both of the Class I railroads that operate in the region: Union Pacific Railroad (UP) and Burlington Northern Santa Fe Railway (BNSF). With the region's largest port, a major airport, numerous rail and trucking resources, Alameda County is a critical hub for goods movement nationwide.

Image from Cambridge Systematics

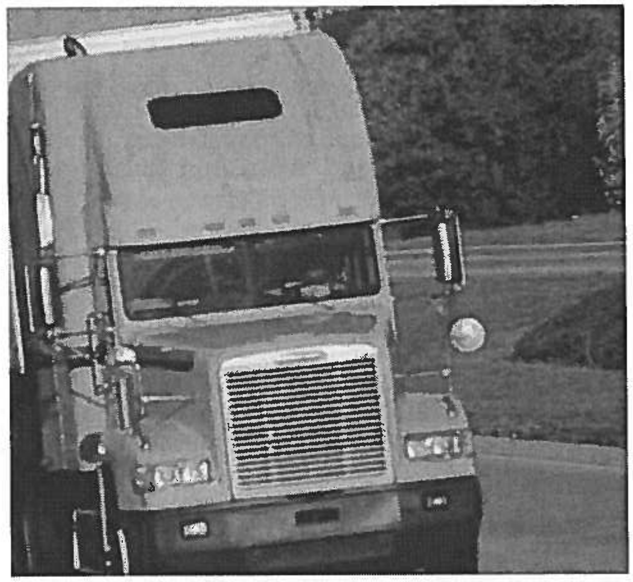
Figure 9-1 Map Showing Major Freeways and Rail Lines



EXISTING CONDITIONS

Truck

According to MTC's □□□□ Bay Area Regional Goods Movement Study Report□trucks move about 80% of the freight tonnage in the Bay Area. Interstates-880, -80, and -580 are the major truck routes in Alameda County. The I-880/I-80 corridor carries the highest volume of truck traffic in the region and among the highest of any highway in the state. I-880 serves the Port of Oakland, Oakland International Airport, and the Oakland Intermodal Gateway Terminal[1], as well as a major concentration of industrial and warehouse land uses. The I-580 corridor experiences the second highest volume of truck traffic in the county, most of it long-haul in nature and involving the heaviest trucks. Increasingly, regional distribution centers have located in the San Joaquin Valley and trucks providing goods to the county and other Bay Area destinations use this corridor for access. The largest truck trip generators in the county are the Port of Oakland and the Oakland International Airport.



Trucks on the highway/roadway
Image from Cambridge Systematics

Rail

Rail carries 6% of the freight tonnage in the Bay Area. Oakland is the center of this rail network in Alameda County. Two Class I railroads operate in the county, Burlington Northern Santa Fe Railway (BNSF) and Union Pacific Railroad (UP) shown in photos below.

The UP line to Roseville, and the BNSF line to Stockton are the two major rail routes in the Bay Area. The UP and BNSF railroads each operate rail yards within the Port of Oakland complex, across the street from Oakland's eight marine terminals. Alameda County and Contra Costa County together are the top origins and destinations for Bay Area rail. The primary rail commodities moved in the area are crushed stone for construction, autos, steel, petroleum products, beverages, and waste and scrap. Rail provides transportation for long-haul bulk movements, and it provides an important transportation link to the Port of Oakland[2].

1 The Port of Oakland Intermodal Gateway Terminal is a near-dock rail facility completed in 2002 to make Port of Oakland more convenient for shippers and more competitive with other West Coast ports. Source: http://www.portofoakland.com/newsroom/pressrel/pressrel_80.asp

2 Source – MTC 2004 Bay Area Regional Goods Movement Study Report

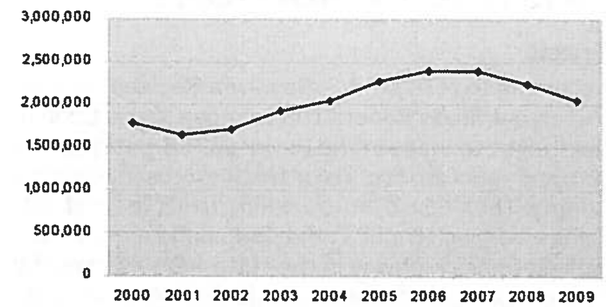
BNSF Train
Image from Wikipedia. http://commons.wikimedia.org/wiki/File.BNSF_1291.jpg. Accessed November 17, 2010.

Union Pacific Train
Image from Wikipedia: http://commons.wikimedia.org/wiki/File.Union_Pacific_Diesel_Locomotive_4218.jpg. Accessed November 17, 2010.

Waterborne

Alameda County's waterborne freight includes containerized cargo at the Port of Oakland. Established in 1927, the Port of Oakland is a world-class international cargo transportation and distribution hub and the third busiest port in the West coast. Over 2 million twenty-foot equivalent units (TEUs) are handled annually by the Port, of which about 58% are exports and 42% imports (Figure 9-2). In 2008, $33 billion worth of goods passed over the port's wharves. The Port is the leading export seaport for the agricultural products from the Central Valley and the Napa Valley and Sonoma wine country. In addition, almost every state in the United States relies on the Port of Oakland for importing or exporting products. The majority of the Port of Oakland's trade is conducted with Asia (78%), with domestic locations in the Pacific, i.e., Hawaii and Guam, a distant second (16%). The port plays a critical role in meeting expected U.S. demand for imports from Asia and sending U.S. exports throughout the world. As shown in Figure 9-2, although port container volumes have decreased in the last three years (by 7% annually), overall the Port has exhibited a positive trend in the last decade with a 15% increase from 2000 to 2009.

Figure 9-2 Port of Oakland Container Volume

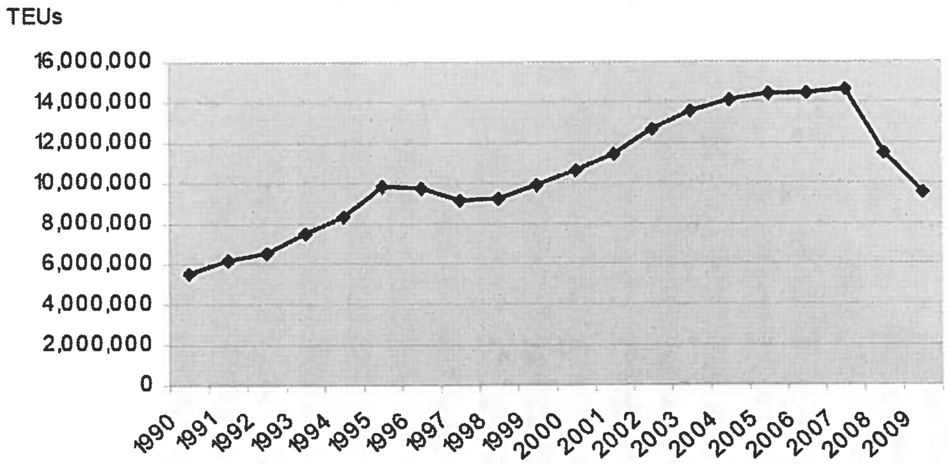


Source: American Association of Port Authorities (AAPA)

Port of Oakland

Image from Cambridge Systematics

Figure 9-3 Oakland International Airport Total Passengers – 1990 to Date



Source: OAK Passenger History by Month Beginning January 1990. Oakland International Airport Website: http://www.flyoakland.com/airport_stats_passenger_history.shtml. Accessed November 16, 2010.

Air

Oakland International Airport (OAK) is located south of the city's central business district in Alameda County. It is one of the three major airports in the San Francisco Bay Area, with 197 daily departures, of which 57 are all-cargo flights. The two passenger terminals and 32 boarding gates are located in the South Field where domestic scheduled services are provided by Alaska/Horizon Air, Allegiant, Delta and Delta Connection, Hawaiian, JetBlue, Southwest, United, and U.S. Airways/U.S. Airways Express. International scheduled services include Volaris with service to Guadalajara, Mexico. The major cargo carriers in this airport are FedEx, UPS, Ameriflight, and WestAir.

Oakland International Airport

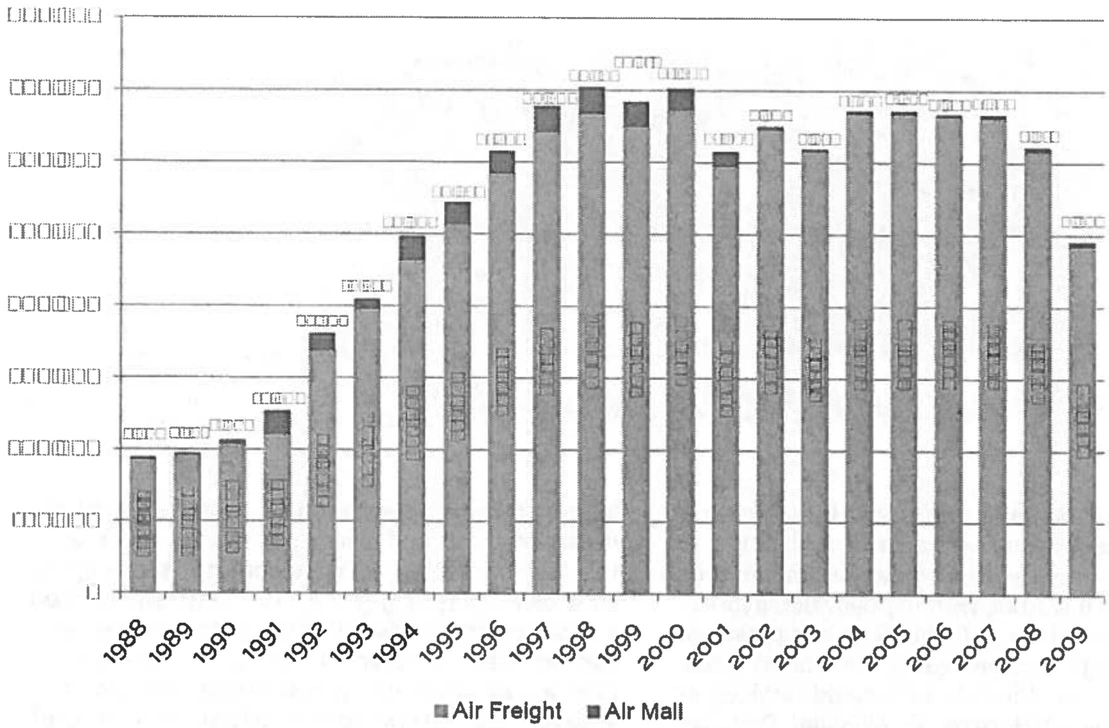
Image from Wikipedia: http://en.wikipedia.org/wiki/File:Two_737s.jpg. Accessed November 16, 2010

In 2007 Oakland International Airport enplaned and deplaned about 14.6 million passengers, of which the vast majority (93%) were domestic passengers. As shown in Figure 9-3, the airport has experienced a 72% increase in passenger volumes over the last two decades. However in recent years there has been a drop in volume (35% decrease from 2007 to 2009), mainly attributed to a shift of domestic traffic from Oakland International Airport to San Francisco International Airport.

In 2008 Oakland International Airport completed major upgrades to its facilities. The $300 million Terminal Improvement Program added a new concourse with five additional boarding gates and waiting areas, expanded ticketing, security and baggage claim facilities, added new utilities, improved terminal access, and eased congestion in front of the terminals through a new roadway and curbside system.

Air freight in the Bay Area is mostly handled by Oakland International Airport. In 2007 Oakland International Airport handled about 661,000 tons of air cargo (Figure 9-4), but this fell to 483,000 tons in 2009. However, in that same year, Oakland was ranked number 12 out of the North American cargo airports for handling freight volume, and it is anticipated that air cargo tons will continue to grow in the next decades.

Figure 9-4 Oakland International Airport Air Cargo Volumes – 1988 to Date



Source: Year-end Airport Statistics Summary, Oakland International Airport Website: http://www.flyoakland.com/airport_stats_yearend_stats.shtml. Accessed November 16, 2010.

Figure 9-5 Actual and Forecast Aircraft Operations at OAK

Aircraft Operations	2007	2020	2035
Passenger Airlines	156,000	161,000	193,000
All Cargo Airlines	32,000	34,000	40,000
GA Jets	19,000	23,000	33,000
Total Air Carrier Runways	207,000	218,000	267,000
GA Runways	130,000	82,000	88,000
Total Airport	337,000	301,000	355,000

Source: Regional Airport Planning Committee, Regional Forecasts by Airport, June, 26 2009.

FUTURE CONDITIONS

Land Use and Goods Movement

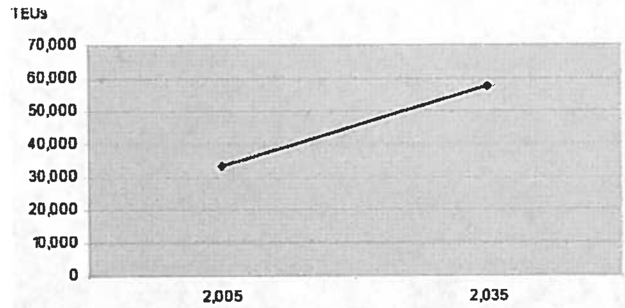
The MTC 2004 Regional Goods Movement Study□ found that development trends and regional growth forecasts indicate increased demand for goods movement services, while at the same time a reduction in affordable, close-in location options for goods movement related land uses. Another study, the □□□□ MTC Goods Movement □Land Use Project □found that under current policies, a large share of the central Bay Area industrial land supply may transition to higher value new uses (office, residential, commercial). For example, 38% of existing industrial land along the East Bay I-80/880 Corridor is already planned for new higher–value uses. These trends could lead to relocation of goods movement related land uses to areas outside of central corridors, potentially leading to increases in land use conflicts, more truck miles and emissions, and higher costs of goods distribution. MTC is working with regional partners, including Alameda County, to develop and pursue specific strategies to address the displacement of goods movement related lands in their counties.

Truck

According to statistics contained in the Alameda County travel demand model, in addition to future forecast information from the Port of Oakland and Oakland International Airport, some of the major freight generators that produce the largest volume of truck trips within Alameda County are projected to be located in downtown Oakland, Fremont Auto Mall (and other adjacent businesses), University of California at Berkeley, and Newpark Mall and Shopping Center in Fremont. Truck trips produced by these locations (including the seaport and airport) are expected to grow on average by 70% in 2035 (Figure 9-6).

All the major truck corridors identified in Alameda County expect growing levels of recurrent congestion that affect the cost of goods movement. The MTC □□□□ Regional Goods Movement Study found that trucks are projected to find it more difficult to avoid peak period congestion in the future since congestion is expected to spread out into traditionally off-peak hours. In addition, this spreading is projected to result in part from future land use trends and policies that will push trucking businesses to the outer Bay Area. In addition to the added costs of congestion to goods movement, another future congestion-related issue impacting truck movement in Alameda County

Figure 9-6 Daily Truck Trips Produced Within Alameda County by Top Transportation Analysis Zones



Source: Alameda County Travel Demand Model using 2007 land use projections.

includes poor travel time reliability due to increased incident-related delays. Collisions involving trucks are particularly common in corridors not designed to handle high volumes of truck traffic, such as segments of I-880.

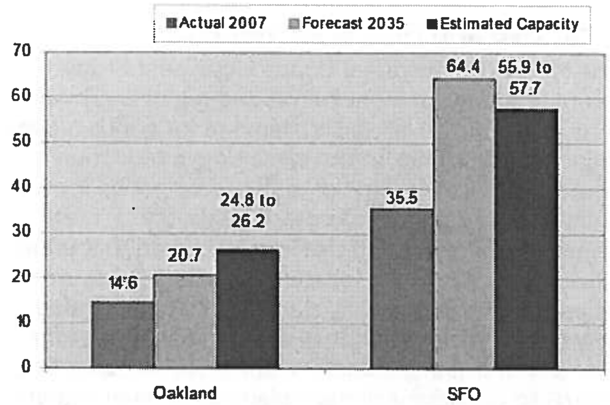
Availability of truck parking is expected to be another future issue. Truckers not domiciled locally prefer to leave the Bay Area at the end of their work assignment in large part because they know there are no satisfactory facilities in the immediate area. Commercial truck stop operators cannot find suitable sites, and if they do, they face difficult local conditions. This issue is projected to be worse by 2035. The □□□□ Alameda County Congestion Management Agency Truck Parking Facility Feasibility and Locations Study recommended that guidelines should be developed for accommodating and developing truck parking facilities, including identifying ways to accommodate truck parking facilities in local land use development processes.

Rail

For the most part, the Alameda County freight rail system is expected to function effectively in the future for the primary markets it serves. However, according to the MTC □□□□ Regional Rail Plan for the San Francisco Bay Area, freight rail traffic demand is expected to increase greatly over the next 50 years. Expanded and improved rail infrastructure will be needed to meet these growing demands and to mitigate any negative consequences associated with increased rail traffic. Specifically, increased traffic at at-grade rail crossings pose problems for the rail network and for passenger car and truck traffic.

AirBART Bus.
Image from Wikipedia: http://commons.wikimedia.org/wiki/File:AirBART.agr.jpg. Accessed November 18, 2010.

Figure 9-7 OAK Annual Passengers



Source: Regional Airport Planning Committee, Regional Airport Study: Airports Trends and Capacity, June 2009

Another future issue facing the rail system in Alameda County is the growing competition between freight rail needs and passenger needs in the Capitol Corridor which runs from Auburn in Placer County to San Jose in Santa Clara County, roughly parallel to I-80. This issue is also visible in the Altamont Pass Corridor (I-580) that runs from Stockton to San Jose. According to the MTC □□□□ Regional Goods Movement Study□more capacity will be needed to address these conflicting needs will likely be needed in the future.

Port

The MTC 2004 Regional Goods Movement Study forecast that volumes of containerized cargo will grow at 5% per year through 2020. The key to improved future utilization of the Port of Oakland is to focus on the transportation facilities in and around the seaport: improving intermodal rail facilities, increasing logistics space, and improving connectivity between the marine and rail terminals.

The Port has a number of major projects planned or underway to address future needs, including new on-dock rail at the Oakland Army Base (i.e., the Outer Harbor Intermodal Terminal (OHIT), and related uses, such as transloading facilities on port property. However, these projects have not been able to move forward due to major funding gaps. They are described under future projects in the following section.

Air

According to the Regional Airport Study being sponsored by the MTC, the Association of Bay Area Governments (ABAG), and the San Francisco Bay Conservation and Development Commisssion (BCDC), and as shown in Figure 9-7, passenger volumes at the Oakland International Airport are expected to grow 42% from 2007 to 2035 (increase from 14.6 million annual air passengers to 20.7 million). Similarly, cargo airlines aircraft operations are forecasted to increase by 25% from 2007 to 2035 (Figure 9-5).

There is some uncertainty about when growth will start occurring due to short-term trends showing declining passenger volumes at the airport. Over the last several years, a major shift of domestic traffic from Oakland International Airport to San Francisco International Airport (Figure 9-7) has occurred. The Regional Airport Study suggests the following possible causes: the launch of Virgin America at San Francisco International Airport and the competitive response of Southwest Airlines and JetBlue; volatile fuel prices, a global recession, and declining passenger demand; and the failure of several carriers at Oakland International Airport due to financial difficulties. However, Oakland International Airport may rebound from these challenges. The study suggests the Oakland market area is forecast to grow more rapidly than the San Francisco market for air travel (based on total household income).

Lack of airport capacity is not expected to be a major challenge at Oakland International Airport. In 2035, the airport is projected to have excess capacity while San Francisco International Airport is expected to be over capacity, presenting an opportunity for Oakland to pick up a greater share of future regional air traffic. However, constraints exist that could prevent Alameda County from meeting air cargo and air travel needs in the future. With domestic cargo focused at Oakland International Airport and international shipments focused at San Francisco International, shippers on both sides of the Bay need access to each airport, usually on very tight schedules. The MTC □□□□ Regional Goods Movement Study recommends that a fast ferry system linking the airport and major shipper concentrations across the Bay should be investigated. Peak period congestion is expected to become a more significant issue for expedited delivery shipments needing access to the airport, particularly related to the evening cutoff for overnight deliveries.

Access for passenger traffic to Oakland International Airport is expected to improve with the completion of the Oakland Airport Connector (OAC). The Oakland Airport Connector is an Automated Guideway Transit (AGT) system planned to connect BART and Amtrak riders at the Coliseum station to Oakland International Airport's terminals. The MTC recently voted to dedicate all $20 million of this year's state transportation improvement funding to the project. Once built, the Connector will replace existing AirBART buses. Design, utility relocation and construction combined for the $484 million project is expected to take three and one-half years to complete.

Two additional factors that could shape future conditions at Oakland airport are 1) potential diversion of air traffic to high speed rail and 2) sea level rise. According to the Regional Airport Study, approximately 9% of total passenger traffic could be diverted to high speed rail by 2035, assuming the system is operational at that time. The study authors indicate that this is a modest amount of diversion. The impact of sea level rise may prove a more significant consideration (Figure 9-8), not just for Oakland airport but for all low-lying infrastructure in the Bay Area. The 2009 Caltrans Vulnerability of Transportation Systems to Sea Level Rise Preliminary Assessment explains that the impacts may include flooding of tunnels and airport runways, washouts of coastal highways and rail tracks, submersion of dock and port facilities, and a potential shift of demand in transportation. Critical facilities at Oakland International and San Francisco International would be highly vulnerable with only additional inches of sea level rise.

Future Projects

The projects listed below have been identified as important to goods movement in Alameda County. Most require additional funds for completion.

Trade Corridors Improvement Fund (TCIF)

Altamont Corridor

The Altamont Corridor is a key corridor for agricultural products being exported from the Central Valley through the Port of Oakland. Several improvements have been proposed for the corridor and would be funded through the Trade Corridor Improvement Fund. These include an eastbound truck climbing lane on I-580 over the Altamont Pass, which will relieve traffic congestion and delay by separating slow moving traffic from existing mixed flow lanes, and safety improvements on I-880 at 23rd and 29th Avenues. As of December 2009, the estimated cost for the truck climbing lane project was $64 million, and expected to be funded entirely by the TCIF. The estimated cost of the I-880 improvements at 23rd and 29th Avenues is $97 million of which TCIF is expected to fund $73 million. Construction is scheduled to start August 2012.[3]

Oakland Trade and Industry Center (OTIC)

There are several capacity enhancement projects currently planned at the Port of Oakland that collectively are called the Oakland Global Trade and Industry Center. These are described below.

Marine Terminal Redevelopment

The Port of Oakland recently entered into a 50-year concession and lease agreement with Ports America Outer Harbor Terminals, LLC. Ports America plans to invest in marine terminal facility improvements. These include new entry and exit gates and substantial upgrades to container handling systems to expand capacity for increasing intermodal cargo volumes.

3 California Transportation Commission http://www.catc.ca.gov/programs/tcif.htm, Accessed November 29, 2010

Figure 9-8 **Shoreline Areas Vulnerable to Seal Level Rise: 2040-2060**

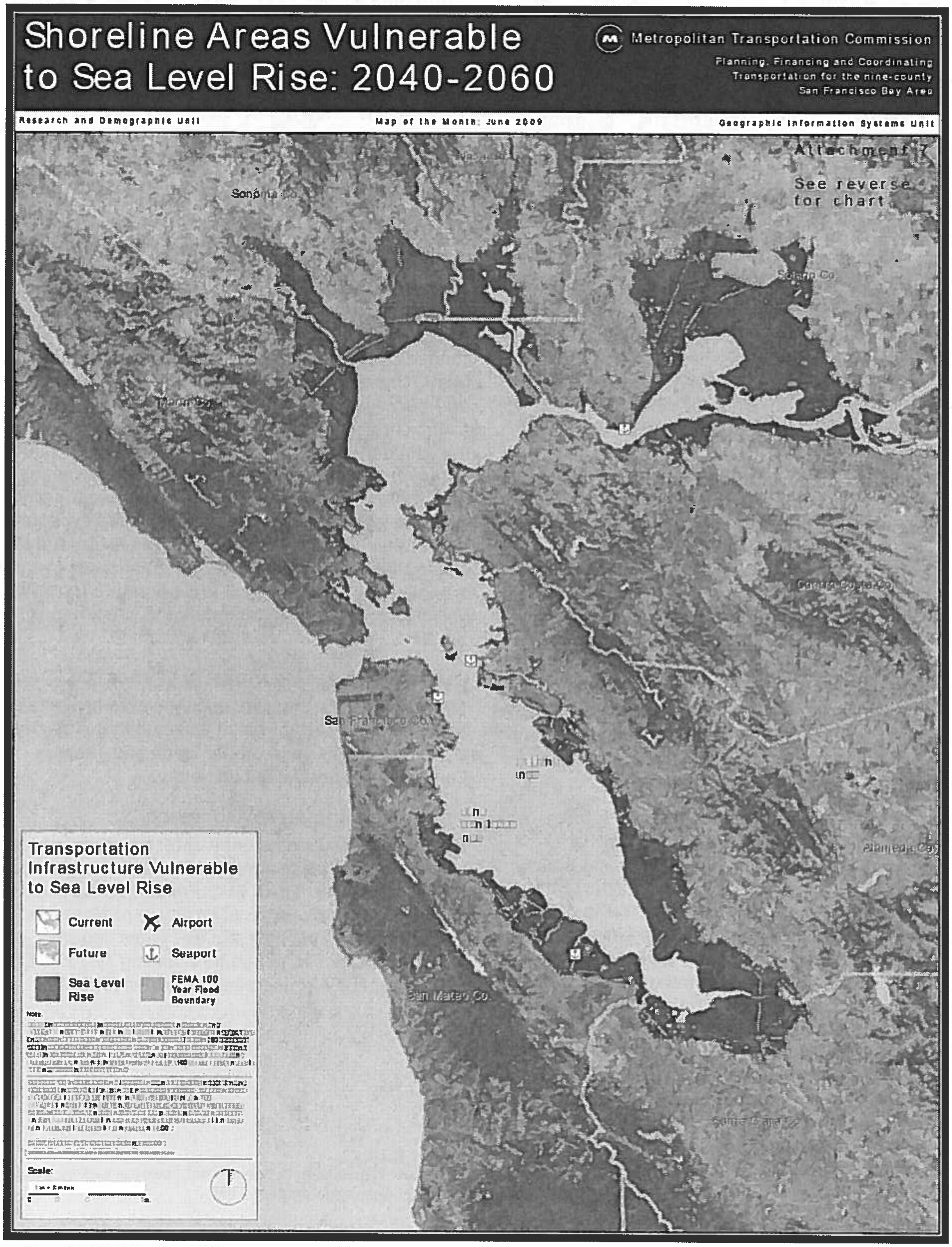


Image from MTC GIS, TeleAtlas January 2008.

Intermodal Rail Terminal and 7th Street Grade Separation

The proposed Outer Harbor Intermodal Terminal (OHIT) project includes a number of improvements including additional rail yards, electric powered rail-mounted cranes for container handling, expanded container storage areas, and other facilities. The project will improve the efficiency of container loading and unloading, increase port-wide intermodal throughput, and reduce congestion on mainline tracks adjacent to the Port.

The proposed 7th Street grade separation project will allow for the expansion of UP and BNSF rail yards and will maximize the benefit of the OHIT. Without the 7th Street grade separation, the benefits of the OHIT would be offset by bottlenecks at rail crossings due to slow train movements conflicting with at-grade truck traffic.

Trade and Logistics Facilities

The project proposes to incorporate more than 100 acres of the former Oakland Army Base adjacent to marine terminals to create new industrial space for goods movement companies to process their cargo. It will also attract other industrial uses that may benefit from being close to a thriving Port, such as manufacturing, assembly, or research and development facilities.

Funding OTIC

The proposed project (OTIC) is expected to cost an estimated $882 million, including $220.5 million for the 7th Street grade separation and $275 million for the new container terminal, site preparation for the trade and logistics facilities and related roadway improvements. Programmed funding through the TCIF, which was approved by the California Transportation Commission, totals $242.1 million for the 7th Street grade separation and the OHIT, which leaves a $253 million funding gap for these two projects. Both projects are scheduled to start in November 2011.

The proposed funding plan for the OTIC also envisions a requested federal share of $190.7 million, while the Port's private partners plan to provide 100% of the funding for the trade and logistics facilities, as well as the marine terminal improvements. Other public funding for the project includes $22 million from the Oakland Redevelopment Agency and $10 million in tax increment funding.

Martinez Subdivision Rail Line

The Port of Oakland and MTC have proposed improvements to the Martinez Subdivision rail line between the Port of Oakland and Richmond. The project will increase rail capacity through the addition of two mainline tracks, crossovers, and signaling. Over 66 trains (Amtrak, BNSF, UP) use this corridor's two mainline tracks per day, and current congestion and delays can be severe. This project is expected to nearly double capacity on the Martinez Subdivision, and will accommodate the additional 22 UP and BNSF trains anticipated by 2020. The cost of the project is estimated to be $35 million, of which 50% has been programmed to be funded by the TCIF. However, as of December 2009 the evaluation of the environmental analysis of the project was yet to be completed and a construction start date had not been scheduled.[4]

Goods Movement Emission Reductions Program

The Bay Area Air Quality Management District (BAAQMD) submitted a Goods Movements Emissions Reduction program for the Transportation 2035 Plan to be funded jointly by the BAAQMD, MTC, and the Port of Oakland. MTC has committed $45 million over five years to advance this program as part of the Transportation 2035 Plan. This program is expected to reduce future diesel particulate matter generated by trucks servicing the region, including the Port of Oakland, by replacing or retrofitting port and general goods movement trucks. The Port has also developed the Maritime Air Quality Improvement Plan (MAQIP) to achieve the 2020 goal of reducing cancer health risk associated with the Port's maritime operations by 85% from 2005 levels. In addition to the MAQIP and the clean truck program, Oakland has also implemented Virtual Container Yard (VCY) software to improve port operations and efficiency.

4 "Amended TCIF Program of Projects 12/1/09. www.catc.gov/programs/tcif.htm

BEST PRACTICES

As a major goods movement hub, Alameda County may benefit from best practices developed in other locations. Best practices are not intended to be directly transferable but provide "food for thought" as projects are developed.

Creating "Green" Freight Solutions: Actions of the Port of Virginia

The Port of Virginia has teamed with partners such as the Virginia Department of Environmental Quality (DEQ), the Environmental Protection Agency (EPA), and a private barge operator to implement environmentally-sound improvements, including:

Inter□Terminal□ntra□Harbor Barge Service□ The □□ Express

The James River Barge Line service operates the "64 Express" as a 100-mile long, inter-terminal, intra-harbor barge service. The marine corridor connects the Port of Hampton Roads with the Port of Richmond's multimodal freight and distribution gateway. Transportation service is provided by low-emission tugboats fueled with ultra-low sulfur diesel engines, allowing the company to offer "a cost effective, environmentally friendly, congestion relieving, and reliable alternative to all truck freight shipments to and from Hampton Roads.[1]" The 64 Express has benefitted the region in several ways:

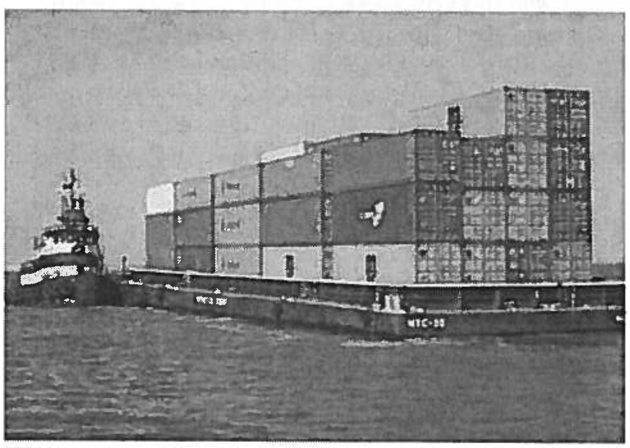
Congestion benefits: In 2009, the barge operator eliminated an estimated 12,000 truck trips from local streets and highways (in particular along I-64[2]). It is anticipated that volumes will double in 2010, removing up to 24,000 trucks from local highways.

Environmental benefits: In 2009, the barge service reduced GHG emissions by an estimated 45% over the previous year. In addition, each container moved via barge (instead of truck) saves an estimated 31 gallons of fuel.[3]

The barge operator is continuing to expand service, in coordination with the local trucking community and regional ports. It is currently planned to expand the barge service in 2011 to transport containers to Norfolk, VA and Portsmouth, VA.

Hybrid and Ultra□Low Emission Locomotives□ The Green Goat

In 2008, the Port of Virginia secured $1.3 million in Federal funding (largely from the EPA), to purchase a 1,500-horsepower switching locomotive that is completely powered by rechargeable batteries. Dubbed the Green Goat□this new locomotive brings several immediate environmental, public health, and economic benefits. The lack of a diesel engine means that there are no diesel exhaust emissions, as well as no associated impacts to local air quality concerns. In addition, the locomotive uses half the amount of fuel of traditional locomotives. In the first 18 months of service, the Green Goat used just 90 gallons of diesel fuel a day as opposed to 180 gallons a day used by traditional locomotives.



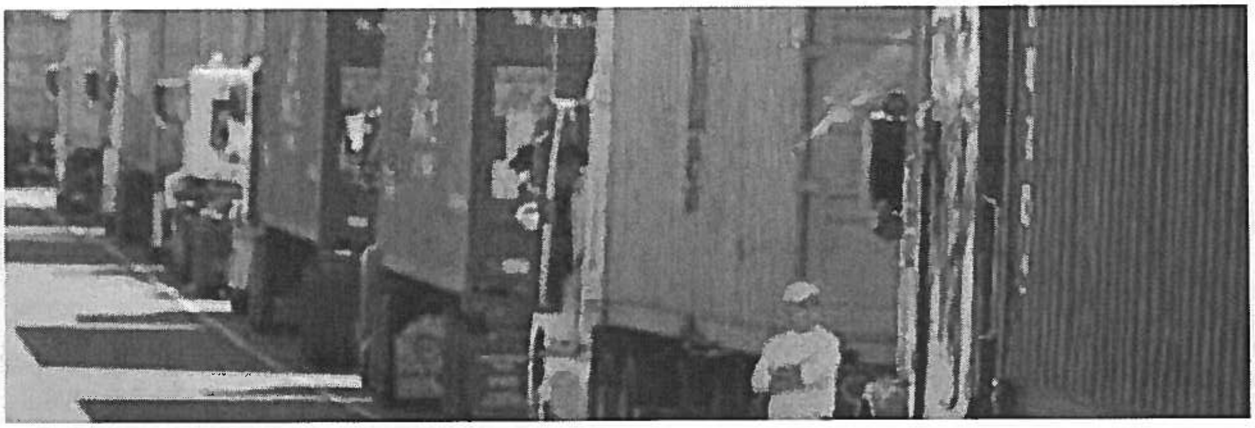
The Port of Virginia's 64 Express Barge Line
Image from The Port of Virginia www.portofvirginia.com

The Port of Virginia's Green Goat Locomotive
Image from www.hamptonroads.com, and Norfolk Southern

3 http://www.64express.com

4 The Craney Island Connection, www.craneyisland.com

5 http://www.64express.com



Trucks Waiting and Idling Outside of a Port Complex
Image from San Francisco Chronicle: www.sfgate.com

Truck Parking Solutions

Many communities across the nation are struggling with illegal truck parking. Generally attributed to a shortage of rest stops and suitable, legal parking for tractors and trailers, communities are dealing with rising numbers of tractors and trailers parking in residential zones, or illegally parking in commercial and industrial zones. This brings with it associated concerns with safety, roadway capacity and environmental and public health impacts. Some potential approaches for alleviating truck parking issues include:

Port of Oakland: Maritime Comprehensive Truck Management Program (MCTMP)

Adopted in June 2009, the MCTMP includes many actions to alleviate the instances of illegal truck parking by trucks serving the Port of Oakland. These actions include:[6]

- **Fund Enforcement through the Oakland Police Department (OPD):** Since 2000, the Port has funded two OPD officers to address truck safety violations, route regulations, and truck parking enforcement.
- **Raise Illegal Truck Parking Penalties:** The Port is considering working with City officials to investigate raising parking violation fees to $250.
- **Determine Community "Hot Spots":** The Port is also considering working with community officials to identify and map "hot spots" for illegally parked trucks, where enforcement and signage efforts can be targeted.[6]

North Jersey Transportation Planning Authority (NJTPA): Options to Reduce Truck Parking Demand

The NJTPA's 2009 report: North Jersey Truck Rest Stop Study Refinement and Action Plan included some options for reducing truck demand as a strategy to address truck capacity and parking issues. Some of these strategies include:[7]

- **ITS Improvement to Utilize Existing Capacity:** Where legal truck parking is offered, ITS should be utilized to advise truckers of available space. This may help to spur the development of more legal truck parking areas, as well as ensure that they are well-utilized.
- **Better Coordination Between Warehouse / Distribution Centers, Ports, and Shippers/ Receivers:** Coordination between the truck driver, dispatcher and pick-up and drop-off locations will reduce the need for staging, missed window times, waiting, queuing, and lost productivity.
- **Transportation Modal Shift:** Mode shift away from trucks, and towards short-haul rail and barging, may be possible in certain regions. This would clearly help to reduce the number of trucks queuing or competing for parking spaces.

6 The Maritime Comprehensive Truck Management Program, The Port of Oakland, 2009.

7 North Jersey Truck Rest Stop Study Refinement and Action Plan, The North Jersey Transportation Planning Authority, 2009.

Virtual Weigh Stations

Remote, unstaffed roadside enforcement facilities (known as virtual weigh stations (VWS)) are currently being studied and implemented in California and other locations nationally for potential application to improve roadside commercial vehicle enforcement programs. VWS can provide numerous operational benefits, including increased pavement/infrastructure protection, improved efficiency of enforcement assets, improved safety, and improved freight data, among others. In addition, VWS can support a reduction in GHG emissions, since trucks are not required to wait in queue at a VWS, and therefore do not idle while waiting for roadside inspections. VWS rely on several different technologies:

- **Interception and inspection** (as needed) of the overweight commercial vehicle.[8]
- **Weigh-in-Motion (WIM)** device (scale or sensors) to measure truck weight at VWS;
- **Camera** to take a picture to identify the vehicle;
- **Screening software** integrates data from the WIM and camera;
- **Dial-up, DSL, or wireless communication** is used to transmit this data to enforcement personnel or to a database management system;
- **A mobile enforcement officer** positioned downstream from the VWS accesses the VWS data and makes a screening decision;

VWS in California – Cordelia Prototype

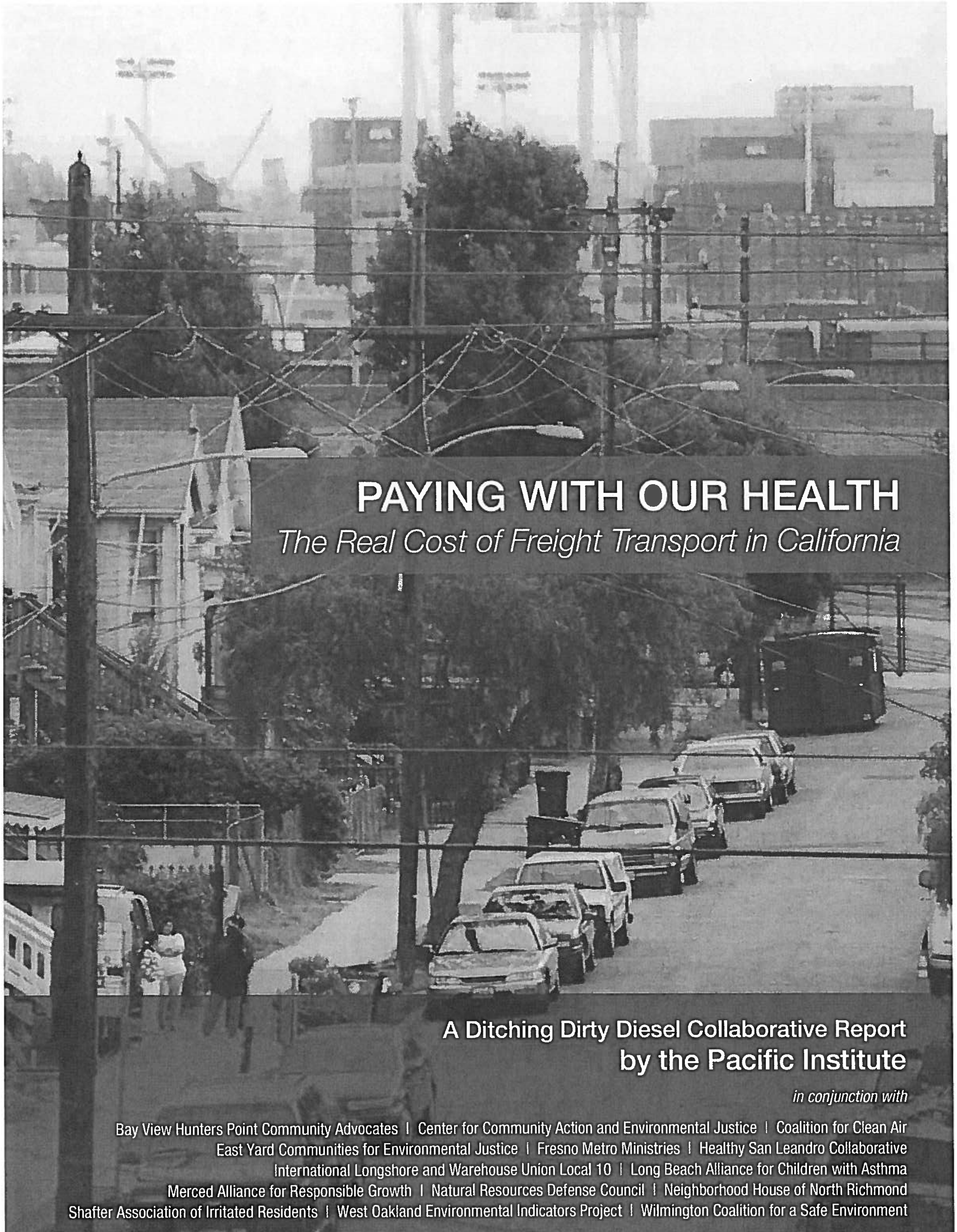
California has a prototype VWS at Cordelia, in Solano County. The placement of the Cordelia virtual weigh station is at a point of congestion on a major Bay Area facility (I-80) that is not easily or cost effectively bypassed by commercial vehicles. It is also located in the same place as the PrePass transponder reader. The Cordelia virtual weigh station's in-pavement technical components include a bending plate WIM scale, a License Plate Reader (LPR), a vehicle detection system, and a camera triggering system. Data integration is performed by computer systems located in three roadside cabinets, which include the control systems, the PrePass computer, and the technology to convert digital images into pictures to match and compare with weight limits and compliance.

SUMMARY OF NEEDS

The future needs of Alameda County's freight system relate to major issues facing all freight modes. Major truck corridors identified in Alameda County (I-880, I-80, and I-580) expect growing levels of recurrent and non-recurrent congestion that affect the cost of goods movement. New strategies will be needed to manage existing capacity on truck routes, improve safety, and relieve bottlenecks where appropriate. Availability of truck parking is expected to be another future issue in the county. Truckers not domiciled locally prefer to leave the Bay Area at the end of their work assignment in large part because they know there are no satisfactory facilities in the immediate area. Expanded and improved rail infrastructure will be needed to meet growing rail freight demands, particularly at at-grade rail crossings and areas of competing passenger and freight demand.

The Port of Oakland has a number of major projects planned or underway to accommodate expected growth in container traffic, but many of these projects face significant funding gaps. Lack of capacity is not expected to be a major issue at Oakland International Airport, but freight linkages between Oakland and San Francisco International Airports may suffer due to regional congestion. Sea level rise is another issue that could impact low-lying freight infrastructure throughout Alameda County, including at Oakland International Airport and the port of Oakland. Finally, the relocation of freight-related land uses outside the metropolitan area may lead to longer truck trips and associated cost and emissions increases.

8 Cambridge Systematics, Inc., Concept of Operations for Virtual Weigh Station Final Report. Cambridge, Massachusetts, June 2009, page 4-6



PAYING WITH OUR HEALTH

The Real Cost of Freight Transport in California

A Ditching Dirty Diesel Collaborative Report
by the Pacific Institute

in conjunction with

Bay View Hunters Point Community Advocates | Center for Community Action and Environmental Justice | Coalition for Clean Air
East Yard Communities for Environmental Justice | Fresno Metro Ministries | Healthy San Leandro Collaborative
International Longshore and Warehouse Union Local 10 | Long Beach Alliance for Children with Asthma
Merced Alliance for Responsible Growth | Natural Resources Defense Council | Neighborhood House of North Richmond
Shafter Association of Irritated Residents | West Oakland Environmental Indicators Project | Wilmington Coalition for a Safe Environment

PAYING WITH OUR HEALTH

The Real Cost of Freight Transport in California

November 2006

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ABOUT THE PARTNERS

The Ditching Dirty Diesel Collaborative is a Bay Area collaborative of over a dozen environmental justice and health organizations who have been working together since October 2004 to reduce diesel pollution and improve health in environmental justice communities throughout the Bay Area. The Ditching Dirty Diesel Collaborative has three active areas of work: diesel idling, goods movement, and capacity building. The Steering Committee of the Ditching Dirty Diesel Collaborative includes Bayview Hunters Point Community Advocates, BVHP Health and Environmental Task Force of SFDPH, Contra Costa Health Services/Contra Costa Asthma Coalition, Ethnic Health Institute, Healthy San Leandro Collaborative, Natural Resources Defense Council, Neighborhood House of North Richmond, Pacific Institute, Regional Asthma Management and Prevention Initiative, and West Oakland Environmental Indicators Project.

The Pacific Institute, celebrating its 20th anniversary, is an independent, nonprofit center created in 1987 to conduct research and develop solutions to the related problems of environmental protection, economic development, and human health. Our Community Strategies for Sustainability and Justice Program was launched in 1995 to assist communities in addressing critical human health and environmental issues. Our goal is to empower community residents so that they can have a real say in their future. Through our numerous community-based participatory research projects, we have helped community residents to ask questions, conduct research, and develop solutions to advocate for improvements in their quality of life. www.pacinst.org

The Natural Resources Defense Council is a national nonprofit organization of scientists, lawyers, and environmental specialists dedicated to protecting public health and the environment. Founded in 1970, NRDC has 1.2 million members and online activists nationwide, served from offices in New York, Washington, Los Angeles, and San Francisco. www.nrdc.org

Bay View Hunters Point Community Advocates is dedicated to improving the quality of life of residents of Bayview and Hunters Point in San Francisco, CA through advocacy, information, community organizing, education, and economic development and projects such as the "Alternative Community Energy Project" and the "Windows Project," which provides outreach and education to residents about pollution issues regarding the Hunters Point Shipyard.

The Center for Community Action and Environmental Justice is a nonprofit organization based in Riverside which brings groups of people together to find opportunities for cooperation, agreement, and problem-solving to build a strong movement for change that recognizes the connections between environmental and worker exploitation, and oppression on the basis of race, gender, sexual orientation, and class. www.ccaej.org

The Coalition for Clean Air is dedicated to restoring clean healthful air to California by advocating for responsible public policy, providing technical and educational expertise, and promoting broad-based community involvement. www.coalitionforcleanair.org

East Yard Communities for Environmental Justice is a nonprofit organization working towards a safe and healthy environment for communities by promoting community participation in making policies and the implementation of environmental justice guidelines for local, state, and federal agencies and industry, through direct democratic decision-making and collective action. www.eastyardcej.org

The Fresno Metro Ministry is an ecumenical and interfaith nonprofit engaged in community problem-solving, advocacy, and community organizing around several primary community issues including environmental justice, hunger and nutrition policy, and access to health care. www.fresnometroministry.org

The Healthy San Leandro Collaborative was created to improve the quality of life and the quality of air for families in San Leandro, CA, a community heavily impacted by the Oakland Airport and truck thoroughfares. www.wafaa4sanleandro.us

The International Longshore and Warehouse Union (ILWU) Local 10 consists of 1,200 members who are longshore workers at the Port of Oakland, the Port of San Francisco, and several other ports in the Bay Area. www.ilwu.org

The Long Beach Alliance for Children with Asthma is a broad-based community coalition working towards changing the profile of childhood asthma in the cities of Long Beach, Carson, San Pedro, and Wilmington through improved health care delivery and quality, outreach, education, support systems, and living environments and through changes in policy at all levels. www.lbaca.org

The MARG Wal-Mart Action Team is dedicated to protecting our quality of life in Merced by preventing the approval of a Wal-Mart distribution center in our community. www.mercedalliance.org

The Neighborhood House of North Richmond, based in Western Contra Costa County, is a private, nonprofit, multi-service agency, with a long community-based tradition of identifying those in need and establishing the resources to address their problems. www.neighborhoodhouse-online.org

The West Oakland Environmental Indicators Project is a community-based nonprofit organization dedicated to using information to improve the quality of life and health of residents living the community of West Oakland, adjacent to the Port of Oakland, through capacity building, leadership development, and community-based participatory research. www.neip.org

The Wilmington Coalition for a Safe Environment works in the community of Wilmington, CA to mitigate, reduce, and eliminate public exposure and public health impacts caused by air, land, and water pollution generated by the Port of Los Angeles, the Port of Long Beach, international cargo and cruise ships, the petroleum industry, energy sources, and the goods movement transportation industry. www.coalitionfase.org

ABOUT THE AUTHORS

Meena Palaniappan is the former Director of the Community Strategies for Sustainability and Justice program and a Senior Research Associate at the Pacific Institute. Ms. Palaniappan is an engineer with more than 10 years' experience in community-based environmental planning and research. At the Pacific Institute, she has directed numerous community-based participatory research projects, including Neighborhood Knowledge for Change: the West Oakland Environmental Indicators Project and several diesel pollution projects. Ms. Palaniappan earned an M.S. in Energy and Resources from the University of California, Berkeley. She also holds a B.S. in Environmental Engineering from Northwestern University. She recently conducted research on sanitation in India through a Fulbright Fellowship and will be continuing her work in this area.

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Appendices are available online at www.pacinst.org/reports/freight_transport

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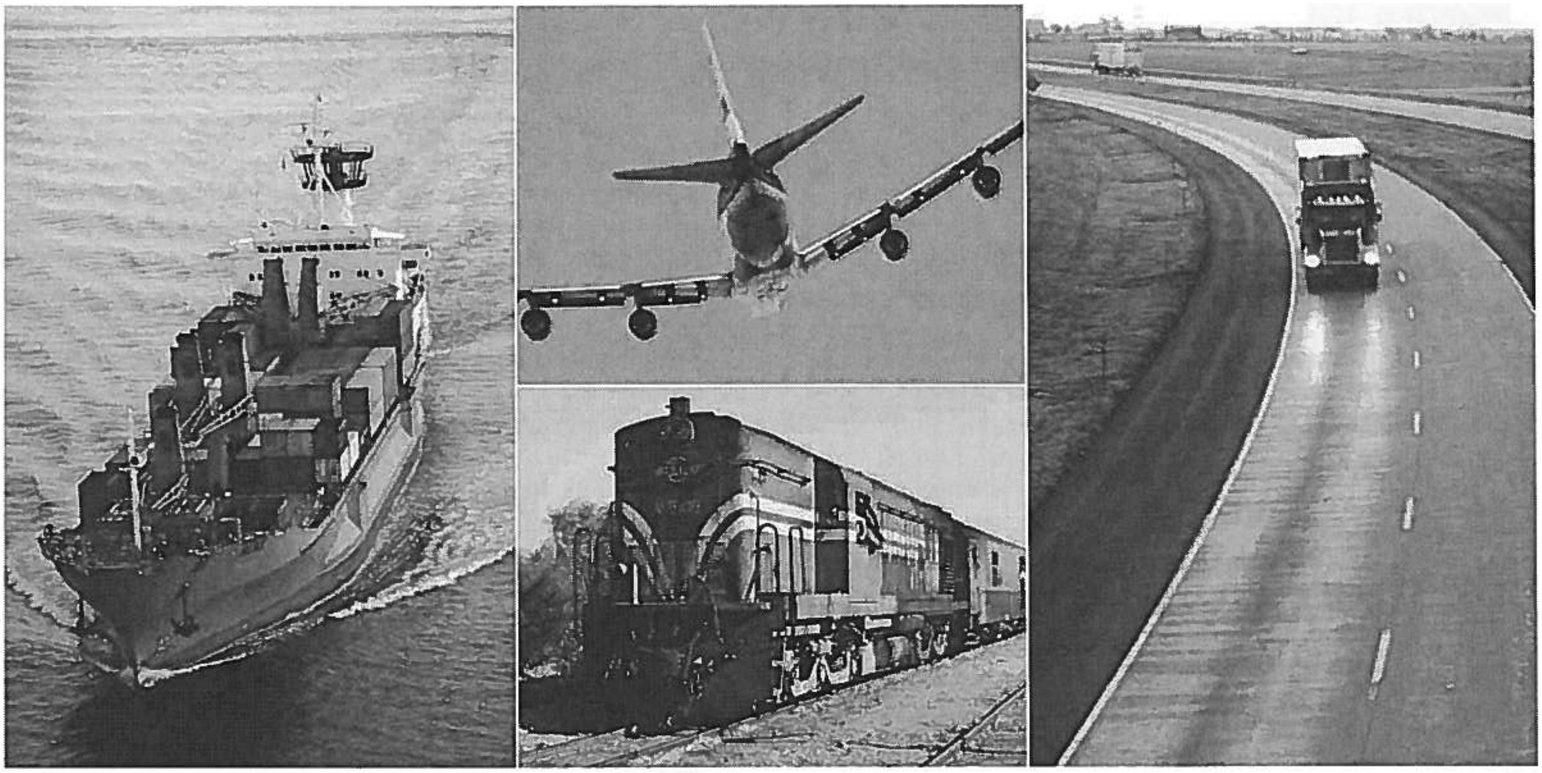
Finally, we would like to thank the Ditching Dirty Diesel Collaborative's membership, who were deeply involved in creating this report through the Goods Movement Subcommittee. Community organizations involved in the Goods Movement Subcommittee attended numerous meetings to develop the concept for this paper and contribute their testimonials. Ultimately, all errors in this report are the responsibility of the report authors.



EXECUTIVE SUMMARY

The Costs of Freight Transport

Imagine where your DVD player has been. Depending on the brand, it may have been produced in Korea, packaged in China, packed in a shipping container, and freighted across the Pacific Ocean on a ship—and then arrived in Long Beach, where it was unloaded by a crane and placed on a truck, taken to a railyard, then to a distribution center, packed onto another truck, and unpacked at the store, where it landed on a store shelf. The ships, cranes, trucks, trains, distribution centers, and airplanes that move our imports and exports make up a complex system of freight transport in the United States.

In this report we show that pollution from this system of freight transport severely burdens Californians, especially the predominantly low-income people of color living close to freight transport hubs. We present data on the high and often hidden health, economic, and social costs that are not accounted for by the freight transport industry. And we tell the stories of people who live, work, and play near California's freight transport hubs. These Californians write what it feels like to live underneath the shadow of seaport cranes, to wake up each morning to the acrid smell of diesel exhaust, to walk to school amid the rumble of slow-moving trucks, to work in an industry that you know is bad for your health, or to go to bed after a long day of tending to your asthmatic child.

The cost of using cleaner equipment and safer technology is a small fraction of the health costs borne by California residents.

The good news is that there are solutions to clean up the system of freight transport and improve the health of California residents. The cost of using cleaner equipment and safer technology is a small fraction of the health costs borne by California residents. We demonstrate that there is plenty of money in the freight transport system to clean up the diesel pollution and health impacts that are left in the wake of the ships, trucks, and trains delivering products to store shelves. This finding is encouraging: California can have its freight transport industry while protecting the health of its residents.

Since the amount of goods transported through California is projected to nearly quadruple between 2000 and 2020,[1] now is the time to implement a range of practical measures that can ensure that our neighbors, friends, and families can continue to enjoy the benefits of our vibrant economy while helping all of us breathe easier and live healthier lives.

Summary of Findings

Over the past year, a coalition of community-based organizations and non-governmental organizations came together to develop a plan to improve health in communities suffering from the pollution of freight transport. We wanted to understand how much it would cost to clean up this system, which players were obtaining the benefits of passing on health costs to Californians, and whether the system of freight transport and its beneficiaries could afford to make the necessary changes to protect the health of Californians. Through our research, we found that:

- **Freight transport will cost California residents $200 billion over the next 15 years in health costs, and most of this is borne by low-income communities of color near freight transport hubs.** The California Air Resources Board (CARB) estimated that freight transport each year causes 2,400 people to die prematurely; 2,830 people to be admitted to the hospital; 360,000 missed workdays; and 1,100,000 missed days of school. The medical and social costs of these impacts are an environmental injustice that affects predominantly low-income communities of color in California.

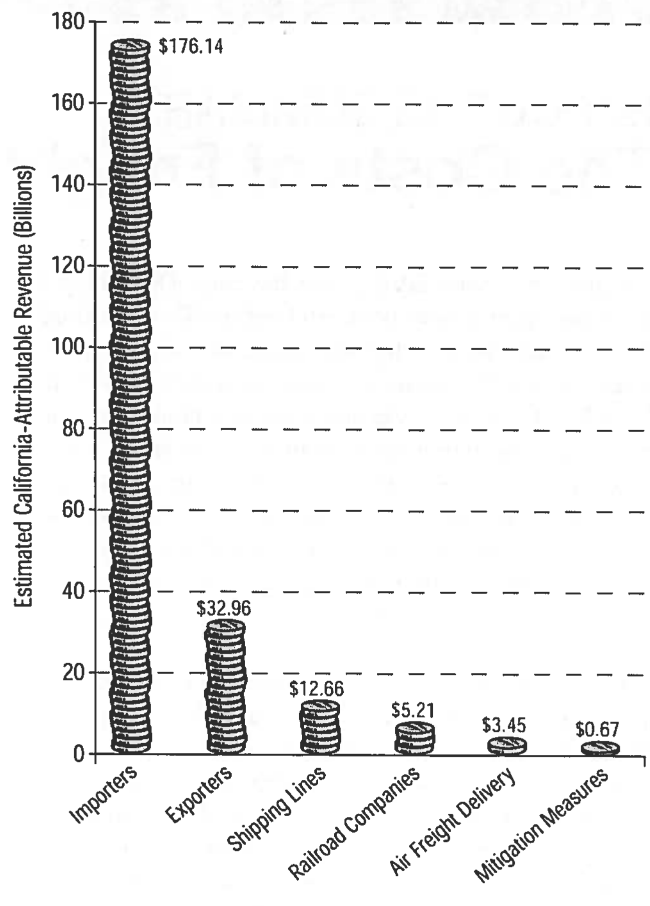
- **Using cleaner equipment and better technology for freight transport will cost just $6 to $10 billion over the next 15 years.** CARB estimates that for every dollar invested in cleaning up pollution from freight transport, $3 to $8 in health costs will be saved.

- **The costs of cleaning up pollution are only a fraction of the benefits derived from the transport of freight.** The good news is that if the major corporations benefiting from freight transport through California paid less than a penny for every dollar in revenue, we could clean up the system of freight transport in California. In fact, cleaning up freight transport in California would cost less than a penny for every dollar in estimated California-dependent revenue made by Wal-Mart alone.

- **There is a range of exciting and effective solutions that can ensure that the health of Californians is protected while freight continues to be moved.** Examples include ensuring that companies internalize the costs of doing business, focusing emissions reductions on the most-impacted communities, and involving communities in decision-making around freight transport expansion.

Consider your globe-trotting DVD player: A few cents of its $100 price tag could lessen the impacts on millions. California could lift the burden off its communities and continue to have a thriving freight transport industry. With exponential growth expected in this industry, it is time for California to do right by its residents.

Figure ES1: Comparison of Estimated California-Dependent Revenue to Health Mitigation Costs



Two Long Beach Mothers

by Oti Nungaray and Adriana Hernandez

Oti Nungaray

RUMBLE, RUMBLE. That's the hum of my community, so close to the nation's largest port complex. The air tickles your throat, but my daughter and I are not laughing. We've been living in Long Beach for ten years. The doctor first diagnosed her with asthma when she was six. It's been traumatizing to watch my child suffer.

Through my involvement with the Long Beach Alliance for Children with Asthma, I've learned about managing my child's asthma, including controlling triggers inside the home. Unfortunately, it's impossible to control the environment outside, when you live next to the largest fixed source of air pollution in greater Los Angeles.

These companies make a lot of money while I spend money on medicine and miss work and my daughter misses school.

I believe there are solutions to these problems. I don't believe industry's claim that reducing pollution will hurt our economy. These companies make a lot of money while I spend money on medicine and miss work and my daughter misses school.

Adriana Hernandez

I LIVE NEAR I-710: a parking lot of nearly 50,000 cargo trucks daily. Next door is Wilmington, an area pockmarked with refineries. We get hit with pollution from all sides. My youngest son was born with a closed trachea and his left vocal cord paralyzed; he still takes speech classes. He also suffered from severe asthma attacks. I had to medicate him and connect him to a breathing machine, feeling desperate that my child couldn't breathe.

Lots of companies are making lots of money, while we pay for medicines, insurance pays for doctor's visits, and the government pays when children miss school. These companies are selfish to not pay the pennies needed to help reduce this pollution.

In doctor visits, medication costs, and a mother's anguish, increased freight transport in Long Beach costs us too much.

CHAPTER 1
Introduction

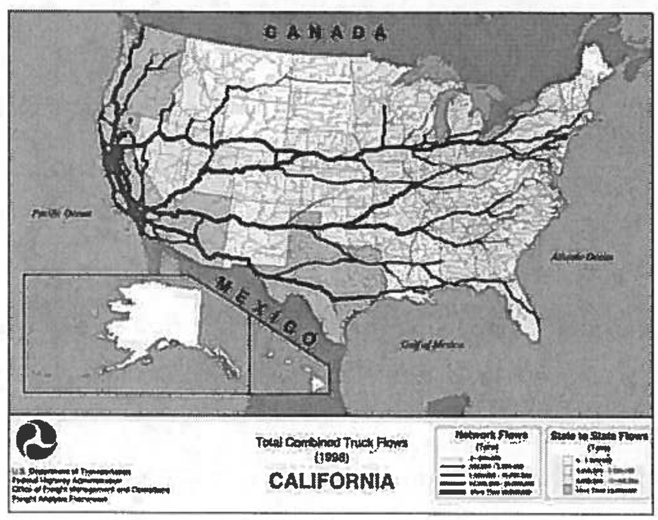
Freight transport is a broad term that applies to the movement of for-sale products from the location of their manufacture or harvest to their final retail destination. U.S. residents all benefit from the availability of imported items in stores, from eating a plum out of season to buying cheaper clothes, sneakers, and electronic items made in Asia.

Many U.S. companies also benefit from being able to ship their goods overseas. Freight transport provides benefits to residents, businesses, and producers living hundreds, even thousands, of miles away. But the health and quality of life costs of freight transport are concentrated in specific areas, particularly the communities living near seaports, airports, railyards, highways, and distribution centers.

A. The California Perspective

California plays a huge role in the transportation of freight across the United States and the entire world. The amount of goods transported through California is projected to nearly quadruple from 11 million cargo container units in 2000 to 42 million in 2020.[2] Improving the movement of goods through California was identified as a high priority by Governor Schwarzenegger, and in

Figure 1: Total Combined Truck Flows to/from California, 1998



Source:
http://ops.fhwa.dot.gov/freight/freight_analysis/state_info/california/ca_combtrks.pdf

2004, the Schwarzenegger Administration created a Cabinet-Level Working Group to develop policies to support the expansion of freight transport in the state. Their goal is to improve and expand California's freight transport industry and infrastructure, while improving the economy, jobs, and public health. The Group released its controversial Draft Framework for Action[3] in March 2006, laying out a plan for freight transport capacity expansion, security improvements, and public health protections.

As community organizations and their supporters, we found the State's Goods Movement Action Plan lacked a clear strategy to fund the approaches and technologies needed to clean up pollution from freight transport and protect health. Importers, shippers, and other stakeholders say the cost of preventing the harm caused by freight transport would be too economically burdensome.

The purpose of this report is to 1) identify the health costs generated by the system of freight transport and the communities that are most affected; 2) provide a voice to affected Californians; 3) profile industries benefiting from the freight transport system; and 4) assess whether the costs of implementing measures to protect health truly present an insurmountable barrier to the companies most benefiting from freight transport through California. While the health costs of freight transport to California residents are extreme, the cost of protecting health is relatively small. Businesses benefiting from the system of freight transport have more than enough funds to implement health protective measures without harming their bottom line or the economy.

Sidebar:

Goods Movement versus Freight Transport

When the State of California released its plan to ease the impact of international trade on California's global gateways, it introduced the term "goods movement." This was a new term for many of the residents living near marine ports or railyards, who did not associate the ships belching diesel soot or the trucks idling outside their windows or the trains rumbling through the night with the concept of "goods." The concept of goods movement begs the question: good for whom?

In this report, we choose to use the more traditional term "freight transport," which has a longer history and a clearer definition: the transport of cargo by a commercial carrier via ship, truck, train, or plane. Freight transport is most recognizable as the millions of sealed massive cargo containers making their way on our state's freeways, rail lines, and coastal waters.

B. The Hubs

The transportation infrastructure that supports the movement of cargo in and out of California is principally comprised of major hubs: seaports, airports, highways, rail lines and railyards, and truck distribution centers. California's eight major seaports transfer containerized cargo, measured in twenty-foot equivalent units (TEUs), from ships to trucks and trains. The average container we see on ships, trucks, or trains is two TEUs in size. In 2004 California's seaports processed over 15 million TEUs, or 42% of all U.S. container trade.[4] The value of these goods was nearly $290 billion. Some seaports transfer bulk cargo like coal, cement, crude oil, chemicals, and automobiles, or loose cargo— also called break bulk—like lumber, steel, or newsprint. Appendix 1 lists a table of the major seaports in California, their size, and major materials transferred.

The Ports of Los Angeles and Long Beach are the largest containerized cargo ports in the nation, and import far more containers than they export.[5,6] The Port of Oakland is the fourth-largest containerized port in the country, and exports slightly more goods than it imports.[7] The Port of San Francisco primarily handles break bulk commodities and some containerized goods,[8] while the Port of Richmond primarily handles liquid and dry bulk commodities and automobiles.[9] The Port of Stockton[10]—California's fastest-growing port—handles mostly agricultural goods and bulk commodities, while the Port of Hueneme primarily handles fruit and automobiles.[11] Almost all goods are imported and exported on ships that exclusively carry cargo.

Airports are another major hub in the freight transport system, although they are not included as part of the state's assessment of the health impacts of goods movement. While the volume and weight of goods traveling via airports is considerably smaller than those traveling through seaports in California, their value is nearly half that of goods coming in through seaports. The value of all imports and exports through California airports added up to $128.6 billion in 2004,[12] which does not include the value of goods transported domestically. California's four major cargo airports, Los Angeles, San Francisco, Oakland, and Ontario, moved over 3.7 million metric tons of air freight in 2005.[13] Cargo is carried by both passenger airplanes and exclusive freight delivery service providers (such as FedEx, UPS, and DHL).

Once goods arrive at seaports and airports, they are transferred onto either trains or trucks. The network of rail lines and highways that crisscross the state is a crucial component of freight transport. So too are the hubs for these two modes of transportation. Trains rely on railyards for storage and repairs and as coordination sites for operations. Most rail operations in California are through the Burlington Northern Santa Fe Railway and Union Pacific Railroad companies, together operating 14 major railyards in Long Beach, Los Angeles, Oakland, Richmond, Sacramento, and several other cities.[14] Trucks traverse the state on heavily trafficked thoroughfares such as the I-5 corridor through the Central Valley and the I-710 in Southern California. In addition, a number of intermodal facilities throughout the state transfer cargo from truck to train or vice versa. Distribution centers are also a major hub in the system of freight transport, attracting hundreds to thousands of trucks a day to unload, unpack, and upload cargo.

C. Snapshot: A Toy Story[15]

Olive's seventh birthday is weeks away. She has her heart set on a doll she saw at the toy store a few weeks ago, and she has already decided that she will name it Kathy. Before that doll can end up in the dollhouse that adorns Olive's suburban Chicago bedroom, Kathy is going to have to go on a bit of a journey.

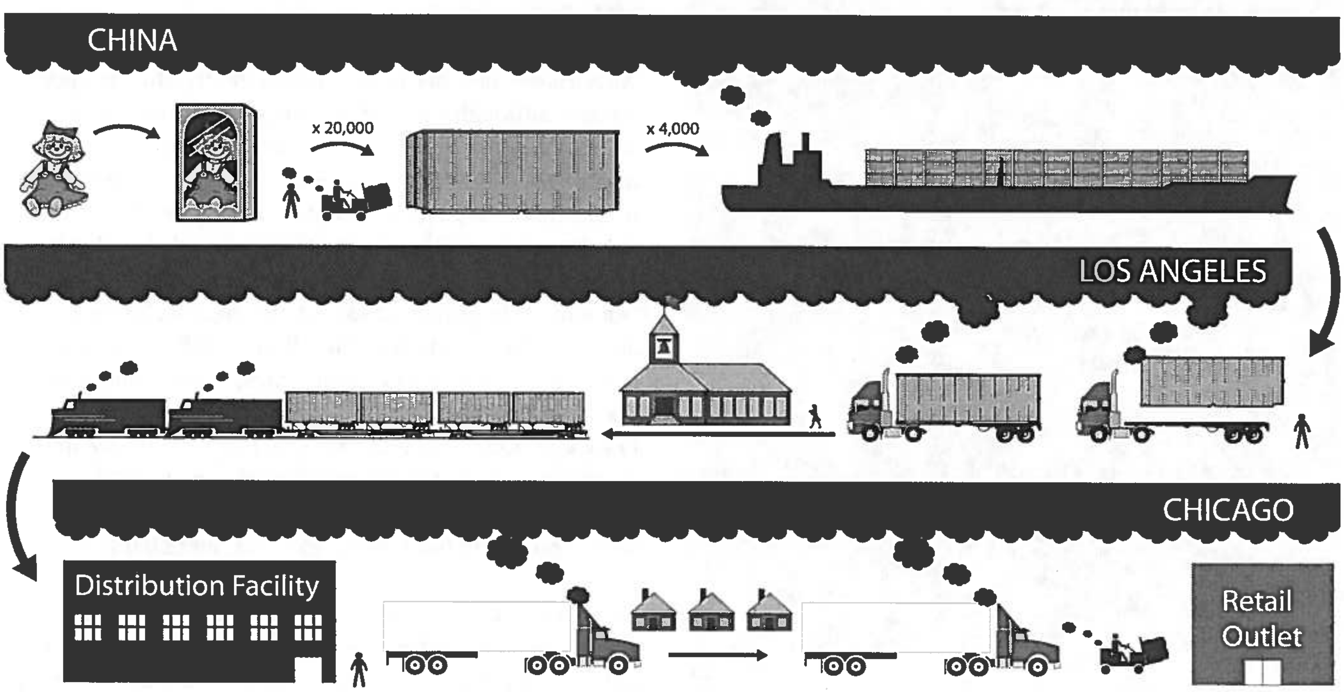
Kathy is assembled and packaged in China and packed with 20,000 others into a 40-by-8-foot container. The container is loaded onto a marine vessel holding 4,000 other containers carrying dolls, shoes, and electronics. Fueled by low-quality bunker fuel, the ship leaves Shanghai and chugs across the Pacific Ocean, belching nitrogen oxides, sulfur oxides, particulate matter, and other pollutants all the way.

Weeks later, Kathy arrives at either the Southern California Port of Los Angeles or Long Beach, which together receive 36% of all U.S. containerized imports. She and the other 20,000 dolls are unloaded by longshore workers. Diesel soot from the ship, the Port's diesel machinery, and the hundreds of idling trucks coats the workers. Olive's doll doesn't get sooty, but the longshoremen will use baby wipes on their hands and faces before they go home.

Kathy takes a ride in the back of a truck to a railyard. On the way she and her friends pass many other children; in fact, the railyard is one-quarter of a mile from schools and homes. Kathy's container is placed on a freight train, pulled by a diesel locomotive. Alternatively, some of the dolls from Kathy's factory are placed on a big-rig truck and sent for repackaging to a mega-warehouse 50 miles from the ports.

After Kathy's train trip, her container is unloaded in a distribution facility. Then, after weeks of being on the move, Kathy finally is trucked to her destination, a big-box retailer in suburban Chicago. By this time, she has traveled more than 8,000 miles, far more than Olive ever could imagine, on diesel-burning conveyances the entire trip.

Figure 2: A Toy Story



Wheezing in West Oakland

by Margaret Gordon

STANDING AT THE WEST OAKLAND BART platform in early September 2005, I looked over the Port of Oakland. A huge vessel stacked with black, red, and gray Lego-like containers was slowly cruising into the port of call.

I've lived in West Oakland for 14 years, yet this was the first time I'd seen a ship come to harbor. When black smoke curled from the top of the ship, the thrill quickly faded. I knew what that black smoke does to the health of West Oakland residents.

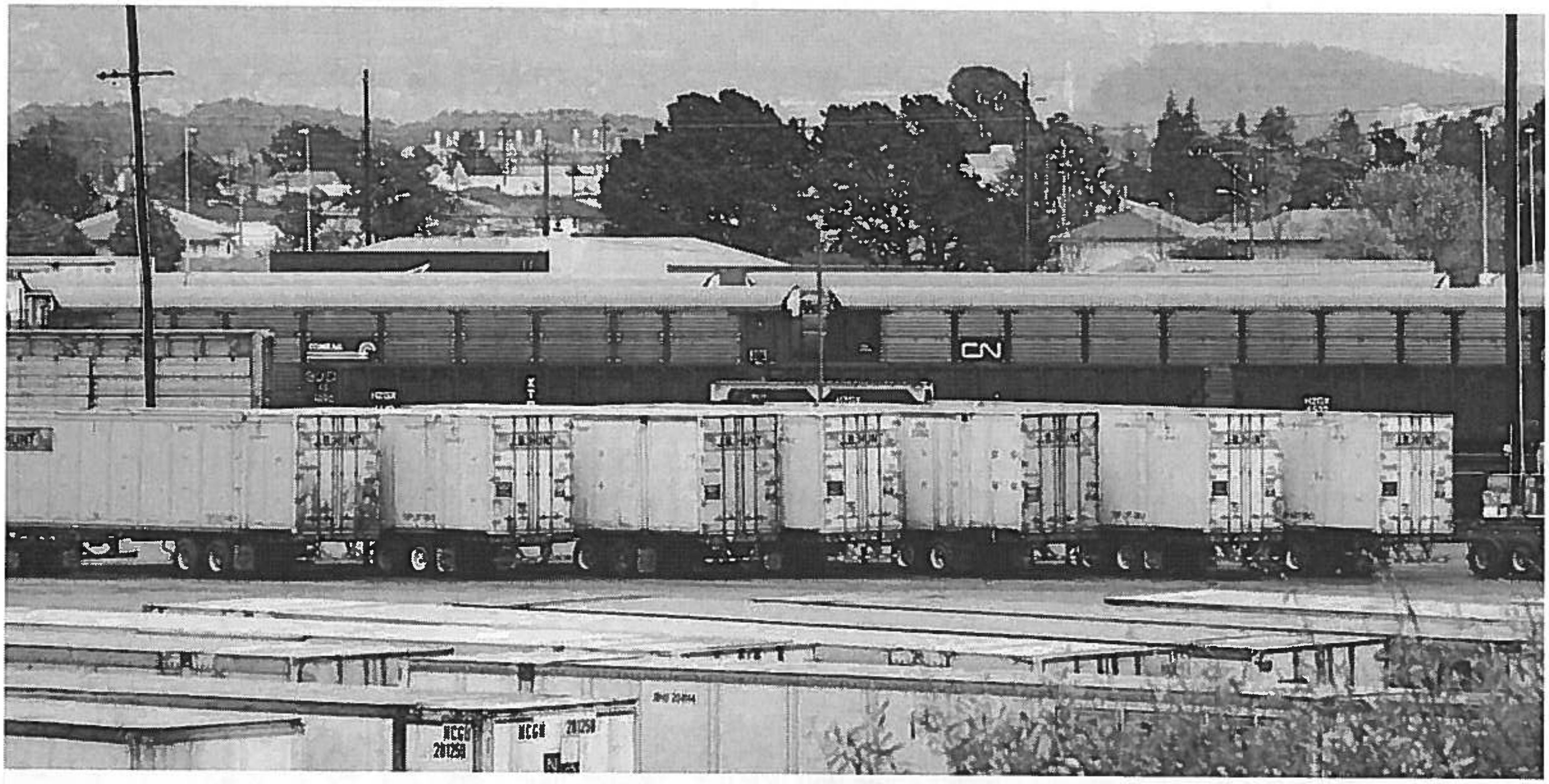
I live less than a mile from the Port in a second-floor apartment along a main thoroughfare for trucks traveling between the Port and the freeway. Three years ago, I was standing in my bedroom with my window open. A truck was parked outside, idling. I started coughing and choking. Within two minutes, I was having an asthma attack. Without my inhalers I could have ended up in the emergency room.

I was standing in my bedroom with my window open. A truck was parked outside, idling. I started coughing and choking. Within two minutes, I was having an asthma attack.

Many of my neighbors have similar stories. West Oakland children are seven times more likely to be hospitalized for asthma than the average child in California. A 2004 West Oakland Community Health Collaborative health survey found that 64% of children in the survey area did not have a regular place to go for medical care. Almost 40% of adults surveyed did not have health coverage – an alarming number considering the health threats presented by excessive diesel truck fumes.

Freight transport will become a bigger problem as the Port expands exponentially. While many benefit from cheaper goods, West Oakland residents pay with more trucks, ships, and trains. Plans for Port expansion are fairly specific, but there are no plans to protect the health of Oakland residents. Until the Port develops a strategy that includes greater profits *and* clean air, I will pack my inhaler wherever I go.

Increased freight transport in West Oakland is costing me and my neighbors in asthma attacks, emergency room visits, and unsafe streets.



CHAPTER 2
The Problem with Freight Transport

A. Health Impacts

Freight transport in California is powered almost exclusively by diesel engines, many of which are old and dirty. The diesel trucks, trains, ships, and equipment used to move goods around the state emit numerous pollutants. Diesel exhaust is a major source of both diesel particulate matter (PM) and nitrogen oxides (NOx) pollution. In all, diesel exhaust can contain an estimated 450 different chemicals, 40 of which are listed by the California Environmental Protection Agency as toxic air contaminants that are dangerous to health even at extremely low levels. There is no level at which these pollutants are considered safe.[16]

Freight transport contributes significantly to ambient air pollution in California. In 2005, freight transport activity (excluding air cargo) contributed about 30% of the total statewide NOx emissions and a stunning 75% of all diesel PM emissions in the state.[17] Diesel particulate matter—microscopic particles produced by combustion—is among the most toxic air pollutants. Sometimes diesel particles can be seen as black soot coming out of diesel vehicles, but most of the time the particles are so small they cannot be seen by the naked eye. Particulate matter is categorized in terms of the size of individual particles—particles referred to as PM_{10} have a diameter of 10 microns (a millionth of a meter) or smaller, while $PM_{2.5}$ particles are 2.5 microns or smaller in diameter. Most diesel particulate matter, about 80-95%, is less than 1 micron in size or about 60-100 times smaller than the width of a human hair.[18] Many other toxic substances in diesel exhaust can also attach onto diesel particles. Because diesel PM is so small, it can carry toxic chemicals deep into the lungs where our bodies have a harder time removing them. The ultrafine particles are so small they can also enter the bloodstream directly, where toxins on those particles may have direct contact with body tissues.[19]

Because diesel soot is so small, it can carry toxic chemicals deep into the lungs where our bodies have a harder time removing them.

Diesel exhaust is associated with a long list of health problems. These include early death (from effects on the cardiopulmonary system, lung cancer, and infant mortality), respiratory problems (including asthma and bronchitis), heart attacks, and reduced birth weight and premature birth.[20] Of all air pollutants, diesel exhaust poses the greatest cancer risk to Californians. The South Coast Air Quality Management District estimates that 70% of all airborne cancer risk comes from breathing diesel exhaust.[21] Each year in California, freight transport causes 2,400 people to die prematurely; 2,830 people to be admitted to the hospital; 360,000 missed workdays; and 1,100,000 missed days of school.[22]

Many studies have shown that diesel exhaust can irritate the nose, sinuses, throat, and eyes; damage the respiratory system; and potentially cause or aggravate allergies.[23,24]

Diesel exhaust leads to inflammation of the airways that may cause or worsen asthma and increase the frequency and severity of asthma attacks.[25] Children are at particular risk from air pollution. Their lungs are still developing and their airways are narrower than those of adults, and they often play outdoors during the day and thus may have greater exposure. Studies have shown that children raised in heavily polluted areas have reduced lung capacity, prematurely aged lungs, and an increased risk of bronchitis and asthma compared to children living in less-polluted areas. Air pollution created by diesel exhaust has also been implicated in pregnancy outcomes, including reduced birthweight and premature delivery.[26]

B. Environmental Justice Communities

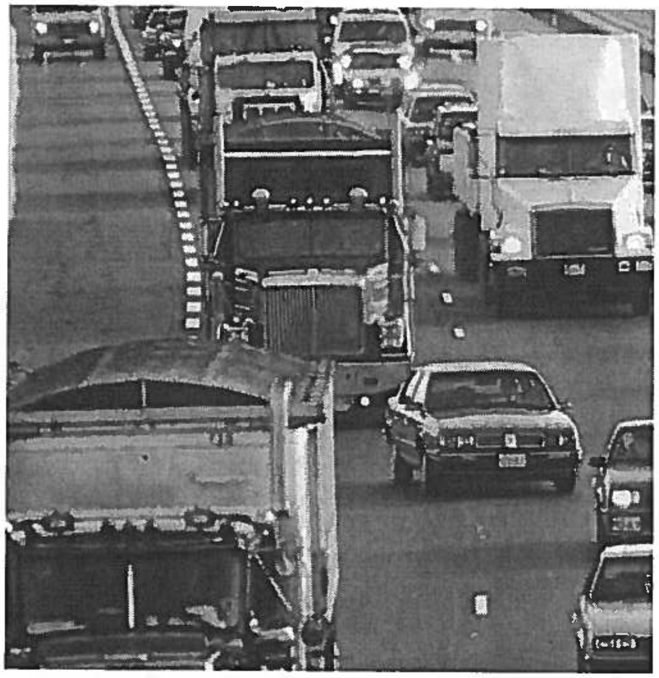
Freight Transport Hubs

Diesel pollution is significantly higher where the freight transport industry is concentrated around seaports, airports, highways, railyards, and truck distribution centers and thoroughfares. Numerous studies show that diesel pollution is highest within 500-1,000 feet of sources like freeways.[27] This means that those California residents living closest to hubs in the freight transportation system are at greatest risk.

Transportation hubs are "magnet sources" of pollution. Although the physical buildings that comprise these facilities do not generate significant quantities of pollution by themselves, the overall facility attracts large numbers of vehicles that collectively produce very large amounts of air pollution. As a result, these hubs effectively become large stationary sources of pollution. Numerous modeling and monitoring studies have confirmed the disproportionate risk faced by residents living near hubs in the freight transport system.

- **Seaports.** A recent California Air Resource Board (CARB) study of diesel pollution from port terminals in Los Angeles and Long Beach concluded that cancer risks associated with the terminals alone exceeded 500 in a million.[28] This risk level is 500 times higher than what is considered acceptable by the federal government and does not include elevated risks from thousands of diesel trucks serving the ports. Cancer risks attributable to port terminal pollution remained elevated, at 50 per million, as far as 15 miles away from the terminals. The CARB study also estimated a number of non-cancer health impacts from the two ports for nearby neighborhoods, including 67 premature deaths and 41 hospital admissions for respiratory and cardiovascular causes in 2005 alone.

- **Railyards.** Locomotives are incredibly polluting, for several reasons. Emission standards for rail engines lag far behind those for trucks and other diesel engines. To make matters worse, many locomotives tend to be very old, predating the first standards. Union Pacific operates almost 500 switching locomotives that are on average 30 years old.[29] A 2004 CARB health risk assessment of a large railyard in Roseville, a suburb of Sacramento, found very high cancer risks from diesel exhaust within 1,000 feet of the facility.[30] Air monitoring done by the South Coast Air Quality Management District in the



City of Commerce, which is home to two major railyards, showed high levels of elemental carbon (used as an indicator of diesel exhaust), translating to cancer risks of 2,000 per million,[31] more than 2,000 times that which is considered acceptable by the federal government.

- **Distribution Centers.** CARB modeling has found that diesel pollution from distribution centers can also greatly elevate cancer risks to nearby residents.[32] In 2001, the South Coast Air Quality Management District conducted air monitoring in Mira Loma, a community with a concentration of distribution centers, showing greatly elevated PM_{10} levels compared to elsewhere in the area. They discovered levels of elemental carbon (an indicator of diesel exhaust) that translated to cancer risks of about 1,600 per million, similar to railyards described above.[33]

- **Freeways and Heavy Trucking Corridors.** Dozens of studies have shown adverse health impacts among people who live, work, study, or play close to high-traffic roadways. CARB air quality and risk analyses show elevated cancer risks near freeways.[34] Impacts appear to be worst near roadways with heavy diesel truck traffic, and children are particularly vulnerable.[35] Findings from recent studies demonstrate that asthma symptoms increase with proximity to roadways,[36] and those living within 650 feet of heavy-traffic and heavy-truck-volume roadways experienced increased asthma

my story

Richmond Parkway:
A Lousy Neighbor

by Lee Jones

NORTH RICHMOND HAS always been an industrial wasteland, and goods movement has broadened its scope. I bought a home in North Richmond in 1999 after I retired. My home lies just a few blocks from the Chevron oil refinery and the Richmond Parkway. I can see the train tracks and yard from my back door. With the increased truck and train traffic the air pollution has reached unimaginable heights. I see and hear the trucks all day and all night, and thousands pass by my home everyday.

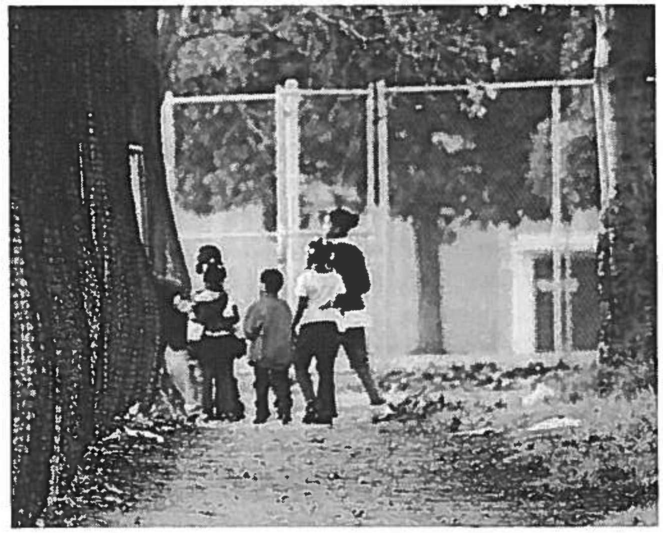
I see and hear the trucks all day and all night.

Soot collects on the sides of my house from the diesel trucks running on the parkway. When I participated in an indoor air study, my home had three times more black soot than the home in Lafayette that was tested, and it was the highest in the test. My monitor went through the roof showing the dramatic difference in air quality for the residents of North Richmond who live on a freeway and residents in neighboring town and cities. We need change here, and we don't have time to wait.

hospitalizations.[37] A recent Bay Area study showed links between elevated levels of pollution and health impacts, including asthma and bronchitis, among children within 1,000 feet downwind of freeways, despite "good overall regional air quality,"[38] while a study of children in San Diego showed that those living within 550 feet of heavy traffic experienced increased medical visits.[39] Several air monitoring studies conducted along major truck routes have found black carbon levels translating to cancer risks of 1,200 to 3,700 per million.[40]

- **Airports.** While little data on air pollution and health risks from airport activity is available, it is widely agreed that airports are a significant source of pollution, including many air toxics. In fact, a U.S. EPA study of a Chicago airport found it to be one of the largest local sources of air toxics such as benzene and formaldehyde.[41] In addition to the poorly regulated emissions from airplanes themselves—which contribute significant quantities of NOx and volatile organic chemicals—the ground transportation required to carry goods to and from airports adds to local air pollution.

Table 1 summarizes diesel particulate matter concentrations near major hubs in the freight transport system, and shows that these are 1.5 to 4 times higher than the State of California average, clearly showing a disproportionate impact. The diesel PM levels in Table 1 are calculated based on levels of black carbon or elemental carbon (both are surrogates for diesel PM) measured near concentrated freight activity areas in various studies. People living near freight transport-related facilities face elevated cancer risks of up to 3,700 in a million, more than six times higher than the statewide average from exposure to diesel PM. The rates of other health impacts near these types of sources are also likely to be much



higher than statewide averages; however, exact statistics are unknown.

Impacted Communities

The "My Stories" peppered throughout this report provide a human face to the freight movement system throughout California. These are the stories that go untold in the race to expand the flow of cargo through California communities. By telling their own stories, communities impacted by freight transport seek to redress decades of disproportionate impacts so that they will no longer bear the health burden of freight transport, while gaining very few of its benefits.

The communities that are profiled here, representing some but not all affected residents, are from all over California,

Table 1

Diesel Particulate Matter Levels Measured Near High-Exposure Locations, Compared to Statewide Average Levels[42]

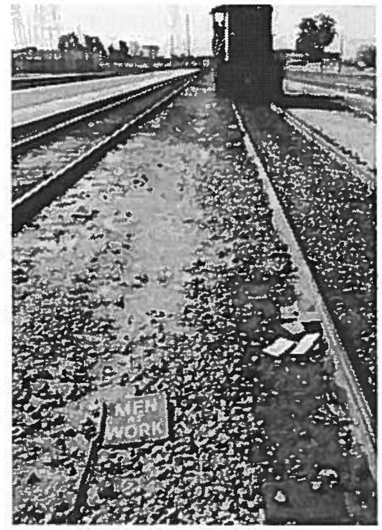
	Trucking Corridors[43]	Railyards[44]	Distribution Centers[45]	Port Terminal[46]	State of California Average[47]
Diesel Particulate Matter (micrograms per cubic meter, µg/m³)	3 – 9	3 – 5	4	~5 (on-site)	2
Associated Cancer Risk Levels	1,200 – 3,700 in a million	1,300 – 2,000 in a million	~1,600 in a million	Not Calculated	600 in a million

from the South Coast to the Central Valley and the Bay Area. Beyond their shared role as the dumping ground for freight transport pollution, they share some other common characteristics. As shown in Table 2 below, these impacted communities are all low-income communities, with an average median income less than 70% of the State of California average. Nearly four out of five residents in these communities are people of color, and they are often less likely to have access to health care. With little political power to make changes, these communities are subsidizing California's system of freight transport.

To achieve environmental justice, we must eliminate the unfair burden borne by low-income communities of color that prop up the freight movement industry. The industry is quite capable of standing on its own and paying for cleaner technologies, instead of standing on the backs of California's poor and minority communities.

C. Impacts on Labor

In addition to the people living side by side with freight transport pollution hubs, another group of people faces equally high exposure. The dockworkers responsible for loading and unloading ships at port, the drivers who haul cargo from port to destination, the railroad workers on the many trains that chug along rail lines, and countless other workers often face the highest exposure to diesel exhaust and other job-related health and safety hazards. The health effects on these workers are more under-compensated expenses in the freight transport industry.



CARB notes that "over 30 human epidemiological studies have investigated the potential carcinogenicity of diesel exhaust. These studies, on average, found that long-term occupational exposures to diesel exhaust were associated with a 40 percent increase in the relative risk of lung cancer."[48] Researchers trying to understand the health impacts of diesel exposure first studied railroad workers. They chose railroad workers because their on-the-job exposures are so high, and because the rates of lung cancer were also unusually high. Several studies have documented the link between railroad workers exposed to diesel exhaust on the job and lung cancer.[49,50] The U.S. EPA has noted "typical" exposure levels for railroad workers of 39 to 191 µg/m^3, considerably higher than the California statewide average of 2 µg/m^3.[51]

Table 2

Summary of Communities Profiled in This Report

Community Name	Zip Code	Major Hubs	Median Income	Percent People of Color
Bayview/Hunters Point—San Francisco, CA	94124	Port of San Francisco	$37,146	94.6
Commerce, CA	90040	Railyards	$35,205	95.4
Fresno, CA	93637	Distribution centers	$37,043	60.9
Huntington Park, CA	90255	Major truck route	$30,375	97.2
Long Beach, CA	90802	Port of Long Beach	$25,860	66.2
Merced, CA	95340	Wal-Mart	$32,573	60.6
Mira Loma, CA	91752	Distribution centers	$37,110	50.9
Richmond, CA	94801	Port of Richmond, Railyards	$33,962	87.2
Shafter, CA	93263	Railyards, Distribution centers	$29,466	69.4
West Oakland, CA	94607	Port of Oakland	$21,124	93.0
Wilmington, CA	90744	Port of Los Angeles	$30,259	92.8
Average			**$31,829**	**78.9**
California Average			$47,493	53.3

Source: U.S. Census, 2000

my story

Surrounded in San Leandro

by Wafaa Aborashed

THE DAVIS WEST Neighborhood is surrounded by pollution magnets. To the west: the ever-expanding Oakland Airport, the railroad, and numerous industrial businesses. To the south: big-box stores and cargo distribution centers. To the east: I-880. To the north: we are downwind from all the activities coming from West and East Oakland.

Our children have to fight with truck traffic to get home from school everyday.

For one young neighborhood child, pollution is not the only concern. "I get out of school knowing that I have to fight to get home … I almost got hit just the other day." She has to sprint to avoid the trucks on Davis Street. "I have asthma attacks every now and then when I reach my home."

We need to reduce air pollution and make our streets more livable. And we need solutions now, not in 2025.

Heavy-duty truck traffic on streets designed for passenger car use increases the risk of collisions with other vehicles and pedestrians.

Dockworkers and truck drivers are two other high-risk groups. One Swedish study found that dockworkers exposed to the highest levels of diesel exhaust were 1½ to 3 times more likely to develop lung cancer than workers exposed to little or no diesel exhaust.[52] Several studies have found excess lifetime cancer risk for truck drivers—some as high as 10 times above what the Occupational Safety & Health Administration considers to be acceptable risk levels.[53] Other studies have found that long-haul truck drivers with the longest driving records are 1½ to nearly 2 times as likely as workers not exposed to diesel exhaust to develop lung cancer during their lives.[54]

D. Other Community Impacts

Air pollution is just one of the ways that freight transport affects human health. A host of other factors either directly or indirectly impacts the health and well-being of people living near freight transport facilities and infrastructure. While seaports and airports often have direct connections to and from local highways, trucks often use local streets to bypass traffic or cut down on travel time. Many ports lack sufficient space for drivers to park their trucks, so they often must resort to parking overnight on local streets, reducing pedestrian visibility and an overall sense of safety in a community. Heavy-duty truck traffic on streets designed for passenger car use also increases the risk of collisions with other vehicles and pedestrians—not to mention the wear and tear on these roads that can damage private vehicles. And anyone who has ever heard a truck rumbling along at low speeds can attest to how loud these vehicles can be.

The presence of railroad tracks, railyards, truck distribution centers, and large trucks on local streets (whether parked or moving)—and the noise from these vehicles—discourages people from taking walks in their neighborhood or visiting their local parks—both important forms of exercise that help people maintain healthy body weights. Recent studies validate the common-sense idea that residents of pedestrian-friendly

neighborhoods are less likely to be overweight.[55] Various studies have cited the link between noise and increased risk of heart attacks;[56] increases in overall stress levels; and impacts on children's mental health,[57] reading comprehension,[58] and school performance.[59] One study that found a link between sleep disturbance and noise specifically cites air, rail, and road traffic as a problem.

These other community impacts are a key part of the overall quality of life impacts from freight transport. Because these impacts have not yet been adequately characterized and quantified, this report does not go into depth on these very important issues. State agencies charged with managing freight transport in California need to pay increased attention to these critical issues and work to mitigate them. In February 2006, comments by members of the state's Goods Movement Action Plan Integrating Workgroup included a comprehensive description of other community impacts.[60] This should serve as a foundation for further analysis and integration of these concerns into cost estimates and mitigation projects related to freight transport.

E. Snapshot: The Hidden Costs of Imported Grapes

In order for consumers to enjoy grapes out of season, those grapes make a very long journey, traveling almost 6,000 miles from the vine to your refrigerator, and creating a lot of pollution along the way.

For example, grapes that are grown in Chile are transported by truck to the port of Valparaiso, where they are loaded onto cargo ships to make the 5,500-mile journey to California, most likely to the Port of Los Angeles. Then the grapes are transported by truck across California to local supermarkets or are transported to a local truck distribution center, where they are loaded onto other trucks that deliver them to retail stores all over the nation.

In 2005, the transport of grapes from Chile to California using trucks and cargo ships resulted in the release of hundreds of tons of pollutants that contribute to poor air quality and global warming, as shown below.

Figure 3: The Cost Paid for Imported Grapes from Chile

A Day in the Life of a Longshore Worker

by John M. Castanho

I ARRIVE AT THE PORT OF OAKLAND just before 8 AM, passing a line of 20-40 trucks waiting to enter the terminal. The smell of diesel exhaust is as familiar to a longshoreman as the smell of salt air is to a sailor.

I change into my work gear, and proceed to the dock. A black smoke-belching tugboat leads the cargo ship to the pier, billowing white smoke that blows inland. Gangs of longshoremen, 20 to 60 in all, commence the day's arduous work. We begin unlashing the containers. The black matter from the ship's smokestacks coats the containers and the ship's deck where I will be working. The "black snow" looks like soot inside a chimney. It will be rubbed into my coveralls and boots. It will stick to the perspiration on my skin.

The smell of diesel exhaust is as familiar to a longshoreman as the smell of salt air is to a sailor.

When the workday ends, I am wringing wet with sweat. Removing my work gear, I pull a box of baby wipes from my trunk. The less of this stuff I bring home, the less my wife and children will come into contact with. In one wipe of my face, large, dark smudges cover the sheet. If this is on my face, my hands, my clothes, and my boots, how much of it entered my lungs today? I have a good paying job, and I'm in good shape, but how much will working in this environment shorten my life?

I have worked in this industry for over 20 years. My father was a longshoreman for 21 years before dying at the age of 45 from asbestosis and throat cancer. Today's longshoremen are exposed to different sorts of carcinogenic substances that need to be eliminated. With ports expanding, the problems of asthma, cancer, and circulatory diseases will only worsen.

In unanswered questions, blackened baby wipes, and lost loved ones, goods movement is costing me and my fellow longshoremen.

The author is currently a longshoreman working at C and H Sugar Refinery in Crockett. He worked at the Port of Oakland for 20 years.

CHAPTER 3
Impact Costs in Dollars and Cents

Four percent of all deaths in California are attributable to air pollution, costing the state $70 billion per year.[62] In their Emissions Reduction Plan for Ports and Goods Movement, CARB calculated that pollution from freight transport was estimated to cost **$19.5 billion** in the year 2005. If nothing is done to clean up the freight transport system, it will cost California **$200 billion** between now and 2020.[63]

The annual cost of the health effects attributable to PM and ozone pollution from freight transport in California is summarized in Table 3. At least half of these health effects are caused directly by PM in the areas closest to ports, railyards, and freeways. Although the cost estimates given for multiple health endpoints, including things like the cost of missed school and work days and health care costs, are in the hundreds of millions, the costs of premature deaths far outranks all other health effects.[64]

In addition, Table 3 does not include many known health effects from freight transport sources of PM and ozone that are currently too difficult to quantify. These include myocardial infarction (heart attack), chronic bronchitis, onset of asthma, premature birth, low birth weight, and reduced lung function growth in children.[66] This estimate also does not include all sources of pollution related to freight transport, including air cargo operations. Thus, the annual cost of $19.5 billion is a conservative figure.

Table 3

Annual (2005) Health Effects of PM and Ozone Pollution from Freight Transport in California[65]

Health Outcome[A]	Cases per Year	2005 Valuation ($ Millions)
Premature Death[B]	2,400	19,000
Hospital Admissions (respiratory causes)	2,000	67
Hospital Admissions (cardiovascular causes)	830	34
Asthma and Other Lower Respiratory Symptoms	62,000	1.1
Acute Bronchitis	5,100	2.2
Work Loss Days	360,000	65
Minor Restricted Activity Days	3,900,000	230
School Absence Days	1,100,000	100
Total	**NA**	**19,499**

Source: California Air Resources Board, March 2006.

A Does not include the contributions from particle sulfate formed from SOx emissions, which is being addressed with several ongoing emissions, measurement, and modeling studies.

B Includes cardiopulmonary- and lung cancer-related deaths.

Trucks, Trains, Illness, and Commerce

by Sylvia Betancourt

I GREW UP IN THE City of Commerce, just east of Los Angeles, between two very large and active railyards. Everyday, we hear the perpetual beeping and rumbling of the trains, so much so that my ears are constantly ringing. Our community is also intersected by the diesel truck-clogged I-710 and pockmarked by a number of industrial toxic facilities.

Growing up, I always felt that something was wrong with living near such massive industry, smelling diesel in the air. I saw friends and neighbors diagnosed with cancer and pass away, but I didn't fully understand the connection with our environment.

I saw friends and neighbors diagnosed with cancer and pass away, but I didn't fully understand the connection with our environment.

A few years ago, the government proposed to expand the I-710 — which already saw 47,000 diesel cargo truck trips per day — to accommodate increased truck traffic resulting from projected port growth. That was the last straw. I became a volunteer with East Yard Communities for Environmental Justice and connected the dots between truck and train emissions and illnesses.

My parents worked hard to secure a home for our family, but the trucks and trains are taking a toll on our lives. My father was a truck driver and a member of the Teamsters Union, so I clearly understand that truck drivers are feeling the impacts along with our community. Unhealthy air where we work and where we live is a violation of a basic right.

It was only a matter time before one of our family members was diagnosed with cancer. My brother's father-in-law lost his battle with throat cancer in February of this year. Breathing clean air is essential for life.

We're not lobbyists, but we are determined to ensure that the community determines its own fate. Railroads and shipping companies need to take responsibility for how their operations impact their workers and their neighbors. Tax money, health, and quality of life should not be a tradeoff.

CHAPTER 4
Plenty to Go Around: Paying to Clean Up Freight Transport

While many people suffer a disproportionate burden of the health and environmental costs from freight transport, a relative few big business and logistics-related industries rely on easy access to these transportation hubs to support their business operations. These businesses include the shipping industries that carry goods to and from California ports, the air freight delivery companies, the truck and train transporters of consumer goods within and out of the state, and the retailers that sell these goods in stores across the United States. By failing to cover their full costs of business, these companies' profits are being subsidized by the health and well-being of the predominantly low-income communities that bear the brunt of freight transport's environmental impacts.

Equitable markets require that all the costs of producing a product are covered by the producer. In economics this is called "cost internalization," or internalizing external costs.[67] A company internalizes its cost when it installs a pollution filter or pays to clean up an accidental spill. If an individual pollutes a stream that he shares with his neighbor, then the individual receives the benefits of being able to pollute (externalizing his costs), while his neighbor bears the cost of not having fish or clean water. Externalizing costs onto those who do not benefit from the transaction involves privatizing a benefit while socializing resulting costs onto the community.[68]

> Companies' profits are being subsidized by the health and well-being of low-income communities.

Externalizing costs is the fundamental problem with the movement of goods through California. This is also sometimes called the "tragedy of the commons," where each individual actor pursuing his own self interest will destroy the commons that all share together. In this conundrum, no one actor can institute cleaner technology without being priced out of the market by his competitors who do not implement cleaner technology.

There are two solutions to the tragedy of the commons problem in market economies. To the extent that any one actor has market power (the ability to set prices for

goods), it can lead the market in implementing and requiring cleaner technology by their suppliers, thus solving the tragedy of the commons. For example, Nike and other sector leaders led efforts to address the widespread use of child labor in the production of apparel and footwear. A market leader such as Wal-Mart, whose revenue is equal to the combined revenue of the next nine largest importers, holds the potential solution to the freight transport system's pollution problem.

The second solution to the tragedy of the commons is that in a more competitive market, the government will need to intervene so that all players can internalize their costs, or clean up their pollution, together.

There is plenty of money in the system of freight transport to pay for the costs of mitigating impacts. In fact, the costs of mitigating the impacts of freight transport are a mere drop in the bucket (or rather drop in the ocean) when we take a close look at the overall value of goods being moved through California's ports, and at the revenue and profits brought in by these companies. In the same way that a company's revenue is used to pay for the costs of raw materials, worker salaries, financing for capital, and (increasingly high) CEO salaries, companies benefiting from freight transport through California should pay for the health costs of moving goods. This can be done by a minor increase in prices (still keeping them below competitors' prices), a minor reduction in rates of return (still keeping profit rates above those of competitors), lower compensation for high-paid corporate officers, or any number of other options. Not only should companies benefiting from freight transport pay the full costs of moving goods, these companies are making more than enough in revenue and profits to cover these costs without it being a financial burden.

This report focuses on the revenue of five types of companies:

- Top retail importers of containerized goods into the United States
- Top exporters of containerized goods from the U.S.
- Top railroad companies in the state of California
- Major shipping lines doing business at California ports
- Major air freight delivery companies in the U.S.

Table 4 summarizes the total 2005 revenue and net income for all of these companies. Revenue are the sales from all operations of these companies, while net income (also known as net profit) is income remaining after all

Table 4

2005 Revenue and Net Income of Freight Transport Industries Nationwide

Sector	2005 Revenue ($ Billions)	2005 Net Income ($ Billions)
Top 10 Importers	625.9	24.5
Top 10 Exporters	363.8	21.2
Top 3 Air Freight Delivery	105.5	8.2
Shipping Lines*	104.2	8.9
Top 2 Railroad Companies	26.6	2.6
Total	**1,226.0**	**65.4**

Source: Hoover's Online (http://www.hoovers.com) July 2006.
*2004 Data.

corporate expenses (including salaries, taxes, and depreciation) are subtracted. These revenues exceeded $1.2 trillion in 2005, while net profit was $65.4 billion. It should be noted that the average net profit margin for the companies that reported both revenue and net income was 6.5%, well above the 3.1% average for all NASDAQ companies.[69]

As a point of comparison, the cost to implement all the mitigation measures CARB proposed in its Goods Movement Emission Reduction Plan ranges from $6 billion to $10 billion for the entire state between now and 2020, or between $400 million and $667 million per year. A comparison of revenue to cost of mitigation measures is provided in Chapter 5.

A. Corporate Importers

The ships, trucks, airplanes, and locomotives involved in freight transport are carrying the cargo of large corporate importers. The companies importing the largest volumes of containerized goods through U.S. seaports have names familiar to most Americans, including Wal-Mart, Target, and Home Depot. As shown in Table 5, the total revenue for these companies in 2005 was over $625 billion. Wal-Mart's total revenue ($312 billion) is equal to the revenue of the next nine importers combined. The net profit of all these companies combined added up to $24.5 billion, of which Wal-Mart accounted for nearly half, or $11.2 billion. These companies together imported 2.6 million containers into the United States, considerably less than the 7.4 million imported through all California ports.[70] Consequently, the total revenue of these 10 companies is likely an underestimate of the total revenue of all companies importing containerized cargo through California ports.

Data on retail importers of goods just through California ports is not available. Because of the large number of intermediaries between the shipping lines and the ultimate retail destination of goods carried by cargo containers, there is no publicly available information on which retail users are using which ports in California, or the volume of their trade through those ports. This list also does not include end users of non-containerized cargo such as automobiles, dry bulk products, liquid bulk products, or break bulk products.

my story

Merced's Potential 230-Acre Neighbor

by Kyle Stockard

I live in Merced, along Highway 99 in California's Central Valley. Wal-Mart recently proposed a 230-acre distribution center, right next to Merced's residential neighborhoods. It would have a warehouse the size of 24 football fields; parking for 1,600 trailers, 300 tractors, and up to 850 passenger vehicles; and 400 loading dock doors.

27,000 new truck trips and 2,150 new passenger vehicles would increase the risk of life-threatening accidents, road damage, and asthma.

Within a mile are three schools, and a fourth is planned for directly next to the facility. The distribution center would add about 27,000 new truck trips and 2,150 new passenger vehicles to our roads every month. This level of traffic would increase the risk of life-threatening accidents, road damage, and asthma and other health risks caused by air pollution. It's not too late for Merced. The more people know, the more they are opposed to a distribution center being built in our neighborhood.

Life in the Diesel Death Zone

by Jesse N. Marquez

I LIVE IN THE Hispanic community of Wilmington in the shadow of the Ports of Los Angeles and Long Beach. When I wake up in the morning I do not smell the fresh clean ocean air or see beautiful blue skies that are only a distant childhood memory. Instead I smell tons of diesel exhaust from ships, cargo trains, and over 45,000 diesel trucks, and see a deadly brown smog cloud

When I wake up in the morning I do not smell the fresh clean ocean air or see beautiful blue skies that are only a distant childhood memory.

looming overhead. Almost every family I know has someone suffering from asthma, respiratory health problems, lung disease, or cancer. Our community is located in what is now called the "Diesel Death Zone." Six people die prematurely every day so that Wal-Mart, Nike, K-Mart, and others can make billions in profits. In 2001 we created the Wilmington Coalition for a Safe Environment to fight for our right to a clean and healthy environment, where the benefits of international trade are shared by all communities.

B. Corporate Exporters

Although the United States is widely known to have a large and sustained trade deficit—the country imports substantially more than it exports—there are numerous profitable companies exporting goods and materials to foreign countries. Like importers, exporters do not need to factor community and health impacts into the cost of exporting their products through seaports. Wastepaper, timber, chemical, and industrial agricultural corporations utilize the country's freight transport infrastructure to export significant quantities of product through California's ports each year. The Port of Oakland is a net exporter of goods, and the Ports of Los Angeles and Long Beach export large volumes of goods as well. Listed in Table 6, the revenue of the top 10 corporate exporters of containerized goods from the U.S. totaled $364 billion in 2005, while net income (profits) added up to $21.2 billion.

C. International and Domestic Shipping

Shipping companies own and operate the large ships that carry as many as 6,000 to 8,000 containers across the ocean, ensuring that containers leaving China or Guatemala arrive in the U.S. and vice versa. These ships produce a tremendous amount of pollution. Regulatory oversight of pollution from shipping has fallen between the cracks—defeated by confusion over jurisdictional authority and a strong industry lobby. While a patchwork of international, federal, state, and local rules applies to various pollution sources related to freight transport, most are weak and poorly enforced.[71] Further, while other diesel sources have been heavily regulated with multiple rounds of increasingly stringent emission standards, the engines propelling international ships (ocean-going vessels) are only bound by one relatively lax emission standard through an international treaty, which does not cover particulate emissions.[72] While a recent BlueWater Network lawsuit against the U.S. EPA established that the agency has jurisdiction to adopt emission standards for all marine vessels regardless of country of origin, the U.S. EPA has yet to exercise this authority.

The fact that ships are highly underregulated bolsters profits, as the true cost of doing business is not fully taken into account. The names of these shipping companies are emblazoned on the sides of shipping containers being transported across the state by truck and train; Table 7 lists the 2004 revenue and net profit data for 11 of these shipping companies. This list includes major companies

Table 5

Revenue and Net Income for Top Importers of Containerized Goods into the U.S., 2005			
Company	2005 TEUs Imported	2005 Revenue ($ Millions)	2005 Net Income ($ Millions)
Wal-Mart Stores	695,000	312,427	11,231
Target Corporation	371,000	52,620	2,408
The Home Depot	335,000	81,511	5,838
Sears Holdings Corp.	240,000	49,124	858
Dole Food Company	169,700	5,871	134*
Lowe's Company	163,000	43,243	2,771
Costco Wholesale Corp	160,000	52,935	1,063
LG International Corp.	127,100	6,217*	77*
Philips Electronic, N.A.	125,000	**	**
Chiquita Brands Intl.	112,300	3,904	131
Ikea International A/S	100,000	18,089	**
Total	**2,598,100**	**625,941**	**24,511**

Source for TEU data: "Special Report: Top 100 Importers and Exporters." Journal of Commerce (May 29, 2006):16A – 48A.

Source for financial data unless noted below: Hoover's Online (http://www.hoovers.com) July 2006.

*Data for 2004, most recent data available for these companies.

**Private company for which relevant financial data is not publicly available.

Table 6

Revenue and Profits for Top U.S. Exporters of Containerized Goods, 2005				
Company	2005 TEUs	Headquarters	2005 Revenue ($ Millions)	2005 Net Profit ($ Millions)
America Chung Nam, Inc.	244,400	CA	505[A]	**
Weyerhaeuser Company	163,200	WA	22,629	733
E.I. du Pont de Nemours & Company	98,000	DE	28,491	2,053
Cargill, Inc.	78,400	MN	71,100	2,100
Koch Industries, Inc.	72,600	KS	80,000	**
International Paper Co.	68,200	TN	24,097	1,100
Dow Chemical Co.	65,400	MI	46,307	4,515
ExxonMobil Chemical Co.	62,300	TX	27,781[B]	3,428[B]
MeadWestvaco Corp.	61,500	VA	6,170	28
Cellmark Group	60,800	Sweden	**	**
Procter & Gamble Company	60,700	OH	56,741	7,257
TOTAL	1,035,500		**363,821**	**21,214**

Source for TEU data: "Special Report: Top 100 Importers and Exporters." Journal of Commerce (May 29, 2006):16A – 48A.

Source for financial data unless noted below: Hoover's Online (http://www.hoovers.com) July 2006.

**These are private companies for which net profit and/or total revenue data is not available.

A Revenue data for America Chung Nam is from 2004, latest year for which data is available. Source for America Chung Nam revenue: Nusbaum, David. "L.A.'s 100 largest private companies: ranked by 2004 revenue." Los Angeles Business Journal (October 24, 2005).

B Data for ExxonMobil is for 2004, latest year available.

that lease land at the Port of Los Angeles, Port of Long Beach, or Port of Oakland. It also includes all the members of the Transpacific Alliance, an industry association of shipping companies serving the Asia-U.S. route.[73] Because two of these companies have no revenue or profit data available, the total revenue for these companies is an underestimate.

D. Rail

The U.S. rail system serves both passenger and freight carriers, with freight far outweighing passenger transport. There are currently 20,000 freight and 400 passenger locomotives operating in the United States,[74] and these locomotives make their way across the country on approximately 140,000 miles of track. The freight transport industry is using rail at an increasing rate. Some of the nation's largest railroads plan to expand their infrastructure to accommodate the increased demand for their services in moving goods across the country. In California, the rail companies are expanding infrastructure to accommodate the growth in trade. For example, Burlington Northern Santa Fe (BNSF) has proposed a major new switching yard in Southern California—just 200 yards from an elementary school.[75]

Table 7

2004 Revenue and Net Income for Top Shipping Companies

Shipping Line	Headquarters	2004 Revenue ($ Millions)	2004 Net Income ($ Millions)
A.P. Moller-Maersk A/S	Copenhagen	30,421	4,464
China Ocean Shipping (Group) [COSCO]	Beijing	17,459 *	**
Nippon Yusek Kaisha (NYK)	Tokyo	13,236	330
Mitsui O.S.K. Lines	Tokyo	9,440	524
Kawasaki Kisen Kaisha, Ltd. ("K" Line)	Tokyo	6,860	314
APL Limited (Subsidiary of Neptune Orient)	Singapore	6,545	943
Hanjin Shipping Co, Ltd.	Seoul	5,921	617
Orient Overseas (parent company of OOCL)	Hong Kong	4,140	670
Evergreen Marine Corporation Ltd.	Taiwan	4,080	378
Hapag-Lloyd Container Line	Hamburg	3,671	386
Yang Ming	Taiwan	2,452	306
China Shipping (Group) Company	China	**	**
Hyundai Merchant Marine Company (HMM)	Seoul	**	**
TOTAL		**104,225**	**8,932**

Source for financial data: Hoover's Online (http://www.hoovers.com) July 2006.

*Revenue for COSCO is for 2005.

**No revenue or profit data available.

Table 8

2005 Revenue and Net Income for Top Railroad Companies in California

Railroads	Headquarters	2005 Revenue ($ Millions)	2005 Net Income ($ Millions)
Union Pacific Railroad Corp	NE	13,578	1,026
Burlington Northern Santa Fe	TX	12,987	1,531
TOTAL		**26,565**	**2,557**

Source for financial data: Hoover's Online (http://www.hoovers.com) July 2006.

Rail is often hailed as a cleaner alternative to trucks. While a single train can replace up to 250 truck trips, locomotives are expected to pollute more than trucks by 2015,[76] since emission standards for locomotives lag far behind those for trucks.[77] Like trucks, diesel trains emit NOx and fine particulate matter. By 2030 the U.S. EPA estimates that, without new controls, locomotives and ships will contribute about 27% of NOx and 45% of fine diesel particulate matter ($PM_{2.5}$) emissions from mobile sources.[78]

In California, two companies—BNSF Corporation and Union Pacific Railroad Corporation—comprise virtually the entire rail industry. The revenue for these two companies alone in 2005 was $26.6 billion, while their profits totaled $2.6 billion.

E. Air Freight Delivery Companies

Although it is frequently left out of discussions and planning for freight transport growth, air cargo plays a significant role in California's freight transport industry, and it is growing at unprecedented rates. California's four major cargo airports—Los Angeles, San Francisco, Oakland, and Ontario—handled over 3.7 million metric tons of cargo in 2005, much of it high-value products such as electronic circuits, aircraft equipment, and apparel. Although the total volume is less than the total volume of goods transported through the state's seaports, the movement of goods via airports does present a serious health concern for the cities that host these four airports. Additionally, these airports are in or near densely populated central urban locations, which means their impacts affect more people.

my story

Hopscotch Along Hwy. 99

by Carolina Simunovic

Margarita Guzman

At recess, the students at Fresno's Addams Elementary have a clear view of Highway 99, two distribution centers, and plenty of diesel trucks. It's no coincidence that Addams Elementary ranks third among all Fresno Unified School District schools for student asthma rates.

It's no coincidence that we rank third among all Fresno schools for student asthma rates.

Parent leaders created Comité ASMA: Addams for Health and a Better Environment to focus on industrial pollution surrounding their children's school.

"We are already suffering from the large number of polluting facilities located in our community" says Tony Diaz, the committee's coordinator. "We are bombarded with diesel exhaust and other air pollution from Highway 99, the railroad, and two large distribution centers."

Margarita Guzman, the committee's president, worries about increasing truck traffic and rail cargo along the 99 Corridor. "Our children are suffering and can't breathe; the last thing this community needs is more pollution."

Air cargo is transported in two ways: by freight delivery and all-cargo carriers, or in the cargo hold of passenger airlines. By weight, the majority of goods that come in and out of California's airports are on all-cargo planes.

We include in our analysis the total revenue and profits for three major air freight delivery companies operating in the United States: FedEx, UPS, and DHL, all of which have operations in California airports.

Table 9

2005 Revenue and Net Income for Major Air Freight Delivery Companies Nationwide			
	Headquarters	2005 Revenue ($ Millions)	2005 Net Income ($ Millions)
UPS	GA	42,581	3,870
DHL	Belgium	33,524 *	2,899
FedEx	TN	29,363	1,449
TOTAL		**105,468**	**8,218**

Source: Hoover's Online (http://www.hoovers.com) July 2006.
*Revenue data for DHL is from 2004.

Sidebar:

Fueling Freight Transport: A Multi-Billion Dollar Industry

From the ships that bring containerized goods to and from California's seaports, to the thousands of cargo-carrying airplanes that take off and land in California's airports each day, to the trucks and trains that move goods from these ports to their final destination—the freight transport industry is dependent on oil-derived fuels. Consequently, the corporations that refine and sell oil to fuel freight transport through California profit significantly from the movement of goods through California.

Although an analysis of the proportion of fuel corporation profits that is attributable to freight transport in California is beyond the scope of this project, data on annual sales and profits of the top five oil companies in the United States are presented in Table 10 for comparison purposes.

Oil company revenue and profits far outweigh revenue and profits in other freight transport industries. The top 5 oil companies made two times more revenue, and over four times the profit, of the top 10 importers.

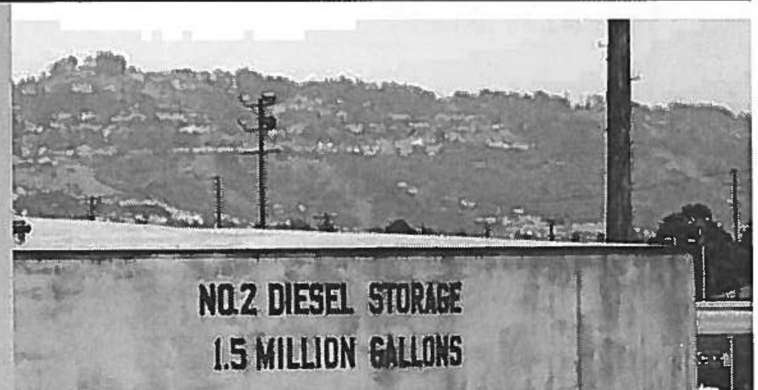


Table 10

2005 Revenue and Net Income for Five Largest U.S. Fuel Companies, 2005		
Company	2005 Revenue ($ Millions)	2005 Net Income ($ Millions)
ExxonMobil	370,680	36,130
BP	245,486	19,642
Shell	306,731	26,261
Chevron	198,200	14,099
ConocoPhillips	183,364	13,529
TOTAL	**1,304,461**	**109,661**

Source of financial data: Hoovers Online (http://www.hoovers.com) July 2006.
Source of Top 5 Company Names: http://www.gravmag.com/oil2.html.

F. Trucking Industry

Port trucking, also called drayage, is a specific segment in the trucking industry that involves the first segment of transportation from the marine port to a railyard or distribution center or directly to retailers or manufacturers. Truckers work through small carriers or brokers to contract with cargo owners or shipping lines to make their deliveries.

Port truckers were significantly affected by deregulation of the industry in 1980, which led to a higher percentage of independent owner-operators who are in turn prevented from organizing for higher wages or benefits due to anti-trust provisions. A 2005 hearing of the California Assembly Committee on Labor and Employment documented that of the 11,000 short-haul truck drivers working in the Los Angeles area, 87% are owner-operators. Port drivers must pay for fueling, insurance, maintenance, taxes, and other fees, and are paid by the load rather than hourly. Numerous trucker strikes throughout the country have demonstrated the difficult working conditions and low pay associated with drayage trucking. Testimony of several truckers during the Assembly hearing exemplified adverse working conditions of truckers who are being squeezed by stagnant wages, increasing turn times at ports, and increased fuel costs. One Oakland driver testified that he works an average of 11 to 13 hours per day. Nearly half of that time can be spent waiting in line at port terminals. He brings home $20,000 to $25,000 a year, with no benefits.[79] Revenue and profit data cannot be presented because individual owner-operators, rather than companies, dominate drayage trucking in California.

my story

Not the Bad Guy: *One Man's Struggle to Work and Breathe*

by Nelson Montoya

I came to the United States from Colombia 25 years ago. I have been a truck driver for 22 years, transporting commercial products to and from the ports of Los Angeles and Long Beach. My truck is a 20-year-old, heavy-duty diesel-fueled 18-wheeler. Truckers barely benefit from freight transport. Many have to work longer hours than are legal just to make as much as the average worker with a high school diploma — just under

I have heard that diesel produces cancer and respiratory illness. But like many other drivers, I do not have insurance to pay for preventive care.

$30,000. I would like to go to the doctor to have a general check-up, especially of the lungs, since I have heard that diesel produces cancer and respiratory illness. But like many other truck drivers, I do not have insurance to pay for preventive health care. I need to have better equipment, a modern truck that will contaminate less. Shipping companies should provide modern equipment — this will benefit the drivers, the community, and the environment.

Adapted from Coalition for Clean Air Fall 2005 Newsletter

Once-Rural Riverside County

by Penny Newman

I'VE BEEN A RESIDENT of the rural community of Glen Avon/Mira Loma for more than 41 years. Located next to Highway 60 and Interstate 15, our unincorporated area is the target of industrial development of massive warehouses and distribution centers. The expansion of goods imported into the ports of Los Angeles and Long Beach has created a demand for rail hauling of goods that has led to the expansion of the Union Pacific railyard — now the largest auto distribution center in the world.

In five years, our sleepy, agriculturally based community turned into a major industrial park. More than 120 warehouses have replaced cow pastures and vineyards. Our mountain views have been replaced by looming cement monoliths. The Union Pacific is now directly next to our high school. Hundreds of trucks park and idle 20 feet from the athletic fields where our children play.

Hundreds of trucks park and idle 20 feet from the athletic fields where our children play.

The Inland Valleys of Riverside and San Bernardino have long had high levels of smog pollution, but recently the main focus has turned to particulate matter (PM). The World Health Organization (WHO) ranked us fourth in the world in PM pollution, after Jakarta, Indonesia; Calcutta, India; and Bangkok, Thailand. According to researchers at USC, the children in our communities have the slowest lung growth and weakest lung capacity of all children studied in Southern California. Asthma and other respiratory ailments are prevalent. Cancer risk from freight transport is 1,500 times the Environmental Protection Agency's "acceptable" risk levels.

With this development, our streets and rural roads have become danger zones. Residents must compete with semi trucks for space on the same roads. Horse riders navigate trails that now wind through industrial areas. Children who once enjoyed the open fields now are confined to their own backyards for recreation.

We greatly fear the prediction that freight transport will increase exponentially. Our families simply can't take any more.

CHAPTER 5
Public Costs and Private Revenue, in Perspective

How much will it cost to clean up the freight transport system in California, and who can pay for it? CARB proposed a package of roughly 30 mitigation measures that are estimated to reduce diesel PM and NOx by a respective 77% and 64% by 2020.[80] These measures are aimed at reducing air pollution emissions from cargo ships, commercial harbor craft, cargo handling equipment, trucks, and locomotives. The total cost to implement all of the CARB-recommended measures by the year 2020 is $6 to $10 billion (in 2005 dollars).[81] If these measures are implemented, CARB estimates that for every $1 invested in cleaning up pollution from freight transport, $3 to $8 in health costs will be saved.[82] Numerous other estimates of mitigation costs have been made by the No Net Increase Task Force for the Port of Los Angeles and the recently released San Pedro Bay Ports Clean Air Action Plan. We will use the CARB mitigation cost estimate because it provides a statewide mitigation number.

To pay the full costs of doing business, companies must pay to mitigate health costs from their operations. To put the cost of the mitigation measures proposed by CARB in perspective, we do two comparisons. First, we compare these mitigation costs to the revenue of companies benefiting from freight transport. Then, we compare mitigation costs to the total value of imported and exported goods traded in California.

> For every $1 invested in CARB's recommended measures, California could save $3 to $8 in health costs.

Table 11 below compares mitigation measures to "estimated California-dependent revenue,"[83] which has been scaled down from total revenue in proportion to California's economic or freight transport activity. The intent here is to compare the total cost of mitigation to a ballpark estimate of the portion of companies' revenue dependent on California's freight transport infrastructure. Because only the top companies are profiled in each category, this is most likely an underestimate of the industry's ability to pay.

Compared to the vast revenue earned by companies that depend on California's freight transportation system, the cost of measures to protect health from the harmful impacts of this system is miniscule. Table 12 compares the total cost of implementing mitigation measures by the year 2020 to the estimated annual revenue derived from freight transport through California.

The cost of implementing all of CARB's proposed mitigation measures is less than a third of a penny for every dollar in revenue that is derived from freight transport through California.

It should be noted that the revenue of the largest importer, Wal-Mart, dominates the total estimated revenue of companies relying on freight transport through California. In fact, the cost of implementing measures to protect Californians' health is just about a penny per dollar of Wal-Mart's estimated California freight transport-dependent revenues.[89]

Another way to put mitigation costs in perspective is to compare them to the total value of imported and exported goods moving through California, estimated to be $456.8 billion in 2004.[90] The cost of implementing all of CARB's proposed mitigation measures is equal to less than a fifth

Table 11

Estimation of the Proportion of Total Revenue for Companies That Depends on Freight Transport through California		
Sector	Total 2005 Revenue ($ Billions)	Estimated California-Dependent Revenue ($ Billions)
Importers	625.9	176.1[84]
Exporters	363.8	33.0[85]
Shipping	104.2	5.2[86]
Rail	26.6	3.5[87]
Air Freight Delivery	105.5	12.7[88]
TOTAL	**1,226.0**	**230.5**

Table 12

Comparison of Freight Transport-Dependent Industry Revenue to Cost of CARB Mitigation Measures		
2005 Estimated California-Dependent Revenue for Corporations Benefiting from Freight Transport	Annual Costs (in 2005 Dollars) of Mitigation Measures (Upper Estimate)	Mitigation Costs per Dollar of Estimated California-Dependent Industry Revenue
$231 billion	$0.667 billion	**$0.0029**

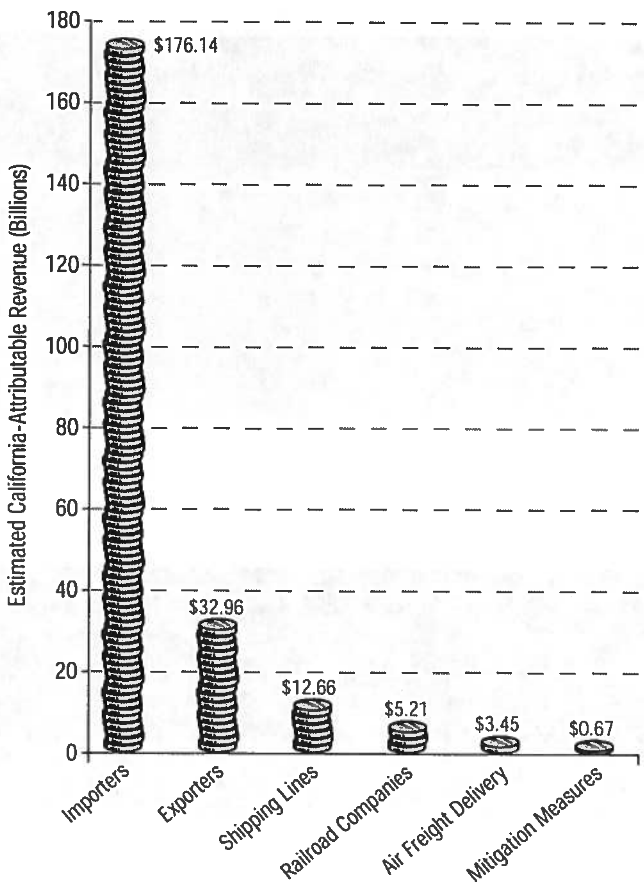
Table 13

Comparison of Value of Goods Transported Through California to Cost of CARB Mitigation Measures		
2005 Estimated Value of Imported/Exported Goods Transported through California	Annual Costs (in 2005 Dollars) of Mitigation Measures (Upper Estimate)	Mitigation Costs per Dollar Value of Goods Imported and Exported through California
$457 billion	$0.667 billion	**$0.0015**

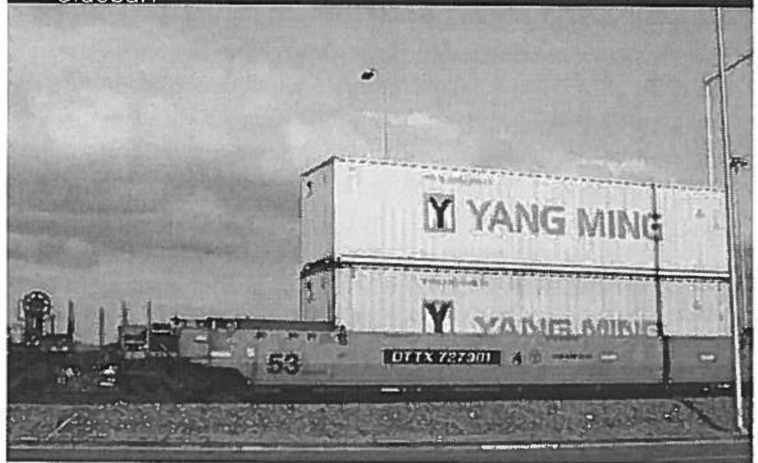
of a penny for every dollar's worth of import/export goods moving through California each year. This calculation does not include the value of goods that only move domestically through California. Including these goods would considerably drop mitigation costs relative to total value of goods.

Whether looking at the revenue of companies that are most benefiting from freight transport through California or at the total value of goods moving through California, the cost of protecting the health of California's communities is considerably less than a penny per dollar.

Figure 4: Comparison of Estimated California-Dependent Revenue to Health Mitigation Costs



Sidebar:



Container Fees Add Pennies to the Cost of a DVD

Container fees are one means of paying for measures to protect health from the impacts of freight transport. A $30 container fee would add mere pennies to the cost of a DVD player (based on DVD box dimensions of 415mm x 88mm x 365mm and an internal volume of 28m^3 for a twenty-foot equivalent container), assuming the entire cost of the fee was passed on to the consumer.

Source: Coalition for Clean Air Fact Sheet.
http://www.coalitionforcleanair.org/pdf/factsheets/SB760-8-8-06.pdf

Whether looking at companies' revenue or the total value of goods, the cost of protecting the health of California's communities is considerably less than a penny per dollar.

Freight Transport around Shafter, California

by Tom Frantz

I HAVE LIVED IN SHAFTER, a small city northwest of Bakersfield, for 50 years. I am a teacher and third-generation farmer. In 1997, Shafter acquired nearly 5,000 acres of farmland to develop the International Trade and Transportation Center (ITTC), located along the Santa Fe rail line and 7th Standard Road. In 2001, Target selected the ITTC for its new 1.7 million-square-foot distribution center.

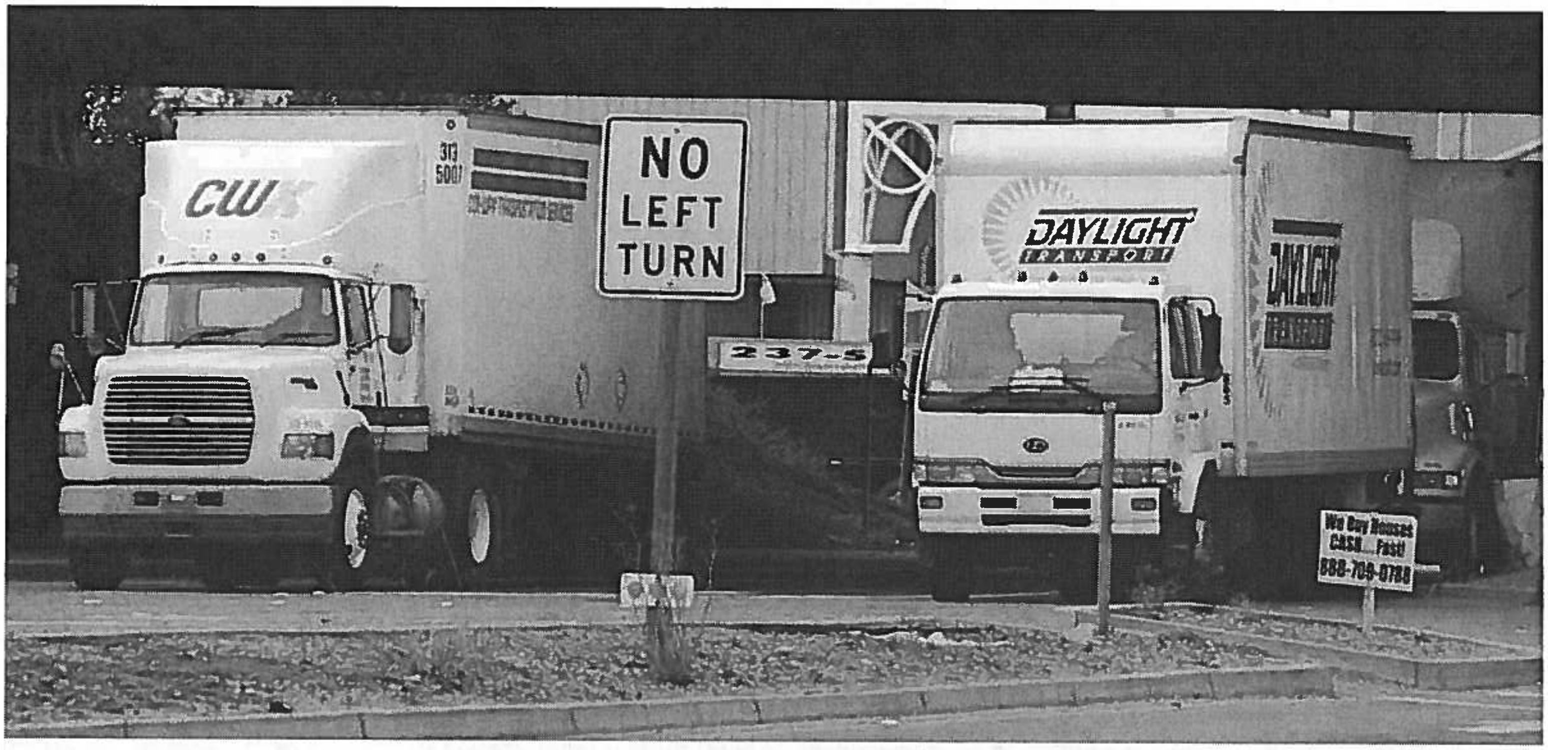
My community has always been dusty in the summer and fall, and hazy in the winter. We now have severe ozone problems in the summer and deadly ammonium nitrate problems in the winter. Our air quality is considered to be among the worst in the country. We need the new distribution and intermodal transportation sites to implement the best-available pollution controls and efficiency standards.

Many of my high school students' absences are attributable to illnesses from bad air. Many experience headaches when the air is heavy with pollutants.

Breathing problems are almost a year-round topic of conversation in Shafter. After my 50th birthday, I developed asthma problems that were unknown in my youth. Many of my high school students' absences are attributable to illnesses from bad air. Many experience headaches when the air is heavy with pollutants. A recent study concluded that the cost of pollution above federal standards in the Valley—in terms of absences from work, health care costs, and premature deaths—is over $3 billion. Increased freight transport through the Valley will only increase our problems.

Like most of my Shafter neighbors, I depend on 7th Standard to get into Bakersfield. It is heavy with truck traffic, and increased rail crossings back up this traffic even worse. Planned improvements to the 7th Standard are sorely due. But small country roads are also seeing a big increase in truck traffic. These roads are deteriorating under this increase in trucks.

In diminished health, missed school and work days, and impacts to our roads and our community, increased freight transport in Shafter is costing me and my neighbors.



CHAPTER 6
Recommendations

Fair Economic Costs

1. Companies must internalize the costs of doing business.

Equitable markets require that all production costs are covered by the company. Externalizing costs onto those who do not benefit from the transaction involves privatizing a benefit while socializing resulting costs onto the community. Importers, shippers, rail companies, and other industries must pay the full costs of moving goods through California, including the health costs from pollution that are borne by California residents. There are numerous ways that the industries that are causing the pollution can pay the full costs of doing business:

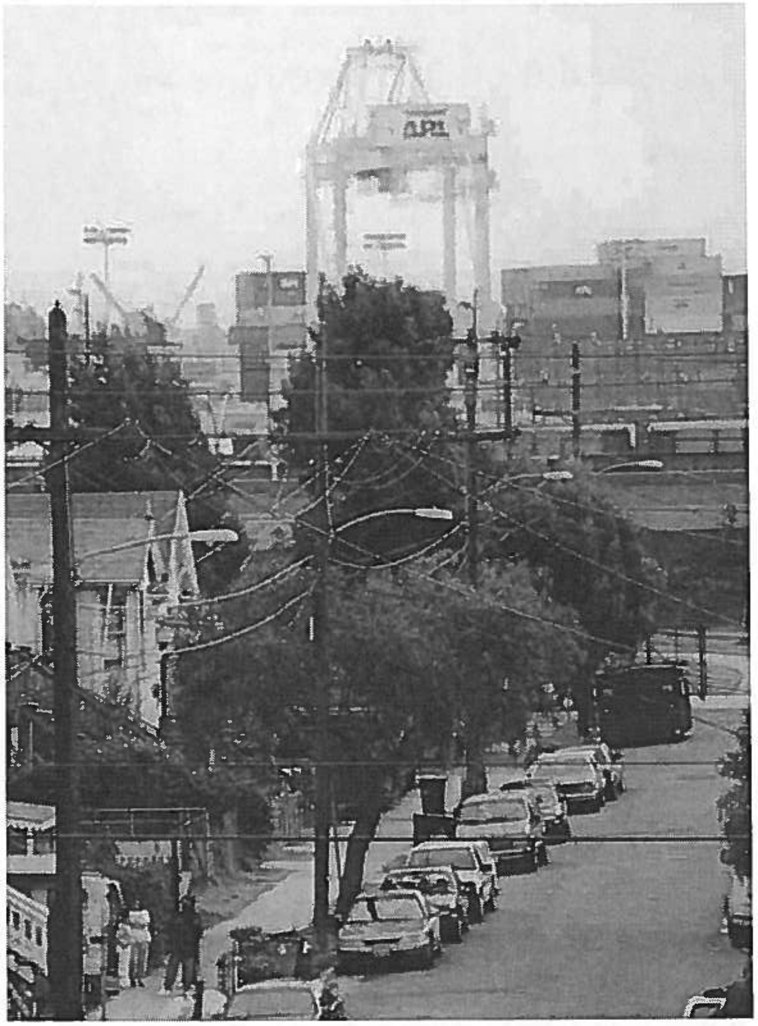
- Importers, exporters, and shippers should be required to pay a charge for each container that comes into or leaves California, which could be used to fund cleaner equipment and technologies to reduce pollution.
- A container charge should be combined with a method to require importers of non-containerized cargo (e.g., cars and crude oil) as well as air cargo to pay a charge for the pollution caused by their operations.

Importers, shippers, rail companies, and other industries must pay the full costs of moving goods through California, including the health costs from pollution that are borne by California residents.

- New infrastructure that is created to ease the movement of goods should require a percentage of funds be used to mitigate community impacts resulting from the construction and use of the infrastructure.

2. California must accurately measure and analyze these costs.

The State of California's subsidy to the freight transport industry yields numerous costs on its citizens. These costs



need to be accurately measured and analyzed. As identified above, health costs are an essential part of the analysis. The actual cost to California taxpayers and insurance ratepayers due to freight transport needs to be evaluated. Ultimately, California taxpayers will pay for the uninsured Californians affected by freight transport morbidity. Insured Californians affected by freight transport will end up driving up health insurance costs for others.

There is also a significant impact from the expansion of freight transport infrastructure on housing costs and real estate values adjacent to freight transport hubs. These have not yet been characterized and require significant study. Environmental costs of freight transport, including ecological impacts and impacts on the built environment, have also not been adequately characterized.

Community-Focused Solutions

3. Impacted communities should be at the center of decision making on the growth and expansion of freight transport.

Too often, the residents that are most affected by the movement of goods through California have been the least able to participate in and make decisions about the expansion of freight transport in the state. It is critical that impacted communities are at the center of decision-making about freight transport. The families surrounding California's railyards, seaports, airports, and distribution centers are bearing the burden of freight traffic without any of its benefits.

Communities should have access to all needed information surrounding freight transport, including the companies involved, how they are benefiting, and what decisions affecting the expansion of freight transport are being made. Residents should be provided funding to be able to participate in key decision-making bodies around freight transport. Meaningful participation means that these communities have equal decision-making power where decisions are made and are not simply involved to satisfy legal requirements while their pleas are ignored.

4. People should be separated from freight transport industry operations.

Living near freight transport operations is a health risk. Yet, land use conflict near freight transport industries is intensifying. While freight transport hubs seek to expand closer to residential areas, city councils throughout the state are approving new housing within 500 feet of major sources of diesel pollution, in clear violation of the CARB land-use guidelines.[91]

To protect community health, the CARB land-use guidelines should be made into regulation that ensures that residential areas are buffered from freight operations. To ensure that those with the power to make decisions on land-use are armed with the right information, CARB should do a statewide education and advocacy campaign to city planning departments, city councils, and planning commissions to alert them to the significant health impacts of residential proximity to diesel sources. Impacted communities should have a central voice in determining land-use decisions in and around their communities. Over time, residential areas should be separated from industrial and freight transport activities through a buffer zone that strictly prevents expansion of one into the other.

5. Incorporate environmental justice principles and analysis in freight transport planning.

Freight transport in California disproportionately affects low-income and people-of-color communities and is an environmental justice issue at a regional and statewide scale. As shown in Table 2, all of the impacted communities profiled in this report are low-income, predominantly people-of-color communities. All California state agencies with a commitment to environmental justice should consider the impacts of freight transport expansion on exacerbating environmental injustice in the state. The Environmental Justice Principles created at the 1990 People of Color Summit should be utilized in conducting planning at the state and local levels. Environmental justice tools such as the precautionary principle and cumulative impact analysis must be used to mitigate community impacts from freight transport.

COMMON-SENSE REGULATION

6. Hubs in the freight transport system should be regulated like factories.

While seaports and other hubs in the system of freight transport effectively serve as large fixed sources of pollution, they are not regulated as such. A factory with a smoke stack is typically far more regulated than a seaport, airport, railyard, or truck thoroughfare, even though these freight transport hubs may cause more pollution. Freight transport hubs serve as magnet sources for pollution, drawing ships, trains, and trucks to them. These mobile sources collect and serve as large fixed sources of pollution. These freight transport hubs, including seaports, airports, railyards, distribution centers, and truck thoroughfares, should be regulated as fixed sources and be required to use the best available control technologies.

7. Focus emissions reductions on the most impacted communities.

The most significant and deadly impacts of freight transport occur at a very local level. For example, diesel emissions are 90 times higher per square mile in West

my story

Trucks on My Street

by Brian Beveridge

I LIVE IN SOUTH PRESCOTT, less than half a mile from the Port of Oakland. Despite all of the streets in our little neighborhood being posted to prohibit trucks over $4^1/_2$ tons, the signs are routinely ignored by truck drivers and the Oakland Police Department.

We have at least one pedestrian death each year due to trucks using our streets as part of their commercial operations.

My trucker neighbors regularly bring their heavy-duty diesel trucks home with them. They occasionally find curb space for the tractors. More often the truck is double-parked on the street, often with trailers attached. A 50-foot trailer is a wall of steel, impossible for drivers to see around when approaching an intersection. Children playing in the street are at risk of being run down. We have at least one pedestrian death each year due to trucks using our streets as part of their commercial operations.

Drivers' training should introduce the idea of community or environmental health. More so, our leaders should better balance the community's fiscal and physical health.

Oakland and over 40 times higher per square mile in West Contra Costa County than the California average.[92] When the state and freight transport industries commit to reductions in diesel emissions, these emissions reductions need to be targeted in the communities that bear the largest disproportionate impact from freight movement. CARB's proposed 85% reduction in freight transport emissions should be translated to a demonstrable 85% reduction in emissions in impacted communities like Wilmington, Oakland, and Mira Loma; these reductions should not be averaged reductions over the entire state.

8. Include mitigation funding with all new infrastructure projects.

Every new infrastructure project should have a significant portion of funds be applied toward the mitigation of community impacts from the construction and operation of the new infrastructure. Proposed ballot initiatives that provide bond funding for infrastructure investments should be required to allocate a substantial portion of project funds to mitigate community impacts from the new infrastructure. There also needs to be a clear recognition of the damaging impacts to community health and safety that current infrastructure has already caused, and efforts to redress these impacts must be sought.

9. The cleanest and most efficient technologies should be used in all cases. Many existing technologies can already provide significant reductions in diesel pollution.

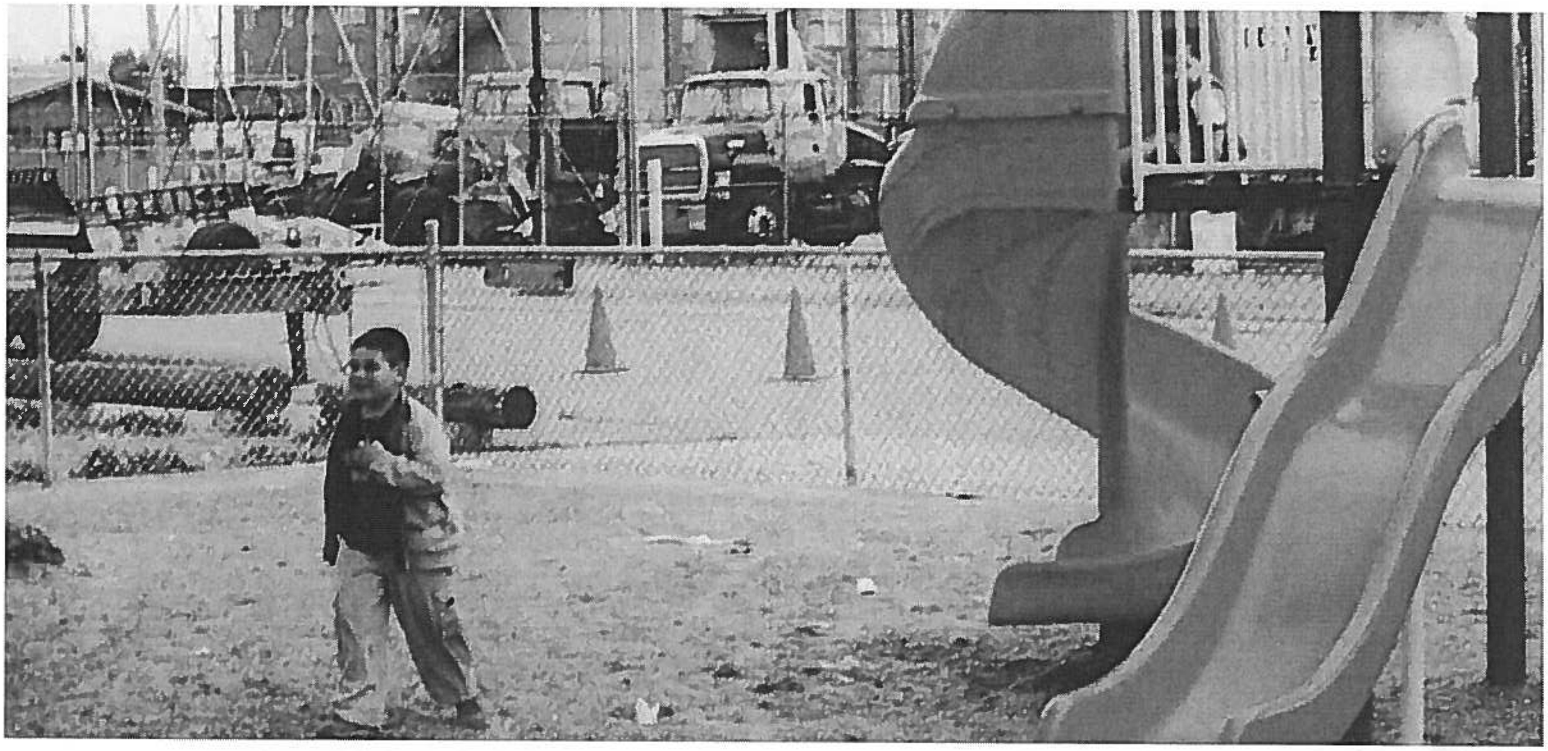
In all cases, the cleanest available technology should be used. The costs of freight transport are significant, and they are borne in health costs to California taxpayers and residents. Purchasing the cleanest technology available is a small fraction of the costs of premature death and illness in California. Clean technologies that already exist but have not been fully utilized include shoreside power for ships, lower emission rail technologies such as the Green Goat hybrid locomotive, and vehicle exhaust controls such as diesel particulate filters.

The freight transport industry also needs to evaluate new transportation methods, moving beyond dated 20th century technology. The logistical challenges involved with moving ever more cargo through California call for new technology to avoid paving over the entire state with twenty-lane freeways. For example, Shanghai employs an elevated magnetic levitation train from the airport to the city. California must explore and invest in such promising new technologies.

The freight transport industry needs to move beyond dated 20th century technology.

10. Subject all final project plans for freight transport expansion to legitimate CEQA review.

The development of a statewide Goods Movement Action Plan should not be used to preclude the requirement for legitimate review of all new infrastructure projects as required under the California Environmental Quality Act (CEQA). Environmental Impact Reports should be developed and mitigation accomplished for every proposed infrastructure project independently and as an entire system to account for systemwide impacts.



CHAPTER 7
Conclusion

The most profitable corporations in the world are making money at the expense of some of California's most vulnerable communities. While many suffer from the health and community impacts of freight transport through California's seaports, airports, rail lines, and highways, a relatively few large business and logistics-related industries rely on easy access to these transportation hubs to support their business operations. Claims that there is not enough money in the industry to cover the unpaid health, environment, and social costs ring hollow. Implementing the recommendations proposed by the California Air Resources Board would cost a fraction of a penny per dollar of these corporations' revenue.

In this paper we have demonstrated the severe costs of freight transport, in dollars, illnesses, and personal perspectives. We have also shown the way to avert these costs—by requiring that the companies most benefiting from access to California's freight transport to cover the cost of their pollution. The health of California as a whole—and its most vulnerable residents in particular—demands it.

Implementing the recommendations proposed by the California Air Resources Board would cost a fraction of a penny per dollar of these corporations' revenue.

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$$\text{Dose Inhaled} = \frac{(C_{air})(DBR)(A)(EF)(ED)(1 \times 10^{-6})}{AT}$$

Parameter	Definition	Value
Dose Inhaled	Dose through inhalation (mg/kg/day)	
Cair	Concentration in air (µg/m³)	(1.38)(BC)
DBR	Daily breathing rate (L/kg body weight-day or L/kg-day)	393 (represents the 95th percentile, or high end*)
A	Inahlation absorption factor	1 (currently used for all substances included in CARB's Hot Spots program)
EF	Exposure frequency (day/year)	350 days/year
ED	Exposure duration (years)	70 years
AT	Averaging time period over which exposure is averaged, in days	25,550 days (70 years)
1×10^{-6}	Micrograms to milligrams conversion (10^{-3} mg/µg), liters to cubic meters conversion (10^{-3} m³/l)	

* This risk assessment does not account for the fact that exposure is higher during infant and childhood years due to much higher breathing rates and other factors; therefore, the high end of adult breathing rates was selected.

• Cancer Risk Potency Factor for diesel PM = 3.0×10^{-4} per µg/m³ or 1.1 per mg/kg-day

• Cancer Risk (chances per million) = Dose Inhaled (mg/kg-day) x Cancer Potency (mg/kg-day)-1 (1×10^{6})

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Black carbon and elemental carbon measurements were converted to diesel PM concentrations per the following method:

Black carbon to elemental carbon = 1.32

Elemental carbon to diesel exhaust particulate = 1.56

Amount of elemental carbon in the air from diesel sources = 0.67 as documented in: STAPPA/ALAPCO, Cancer Risk from Diesel Particulate: National and Metropolitan Area Estimates for the United States, March 15, 2000.

Concentration in the Air = (BC)(1.32)(1.56)(0.67) µg/m^3 diesel PM,

where black carbon and elemental carbon levels are measured in µg/m^3.

Cancer risks associated with DPM were calculated per methodology from Cal EPA, Office of Environmental Health Hazard Assessment. See methodology in note 31, supra.

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80 California Air Resources Board. 2006. Based on Tables 2 and 3 on pages ES-5 and ES-8-9. The following strategies are excluded from the tally, as no emission reduction or cost figures are supplied and the strategies appear to be outside of ARB's control: Operational Efficiency, Land Use Decisions, Project and Community Specific Mitigation, and Port Programs to Reduce Emissions.

81 California Air Resources Board. 2006:ES-12.

82 Ibid.

83 Ideally, we would be able to precisely calculate the proportion of total revenue that depends on freight transport through California. Lacking access to detailed corporate financial data on California-based revenue, we have scaled total revenue for each sector down to a figure that may more accurately represent an estimated California-dependent revenue figure.

84 Total importer revenues multiplied by the proportion of all containerized cargo imported into the U.S. that comes through California's seaports (46.9%) [Haveman JD et al. 2006, at Table 13.] multiplied by the share of the top importer's retail products that are imported (60%) [Stanley, Morgan Stanley. Quoted in American Federation of Labor/Congress of Industrial Organizations Fact Sheet "Wal-Mart's impact on India's suppliers and small businesses." March 2004].

85 Total exporter revenues multiplied by the proportion of all containerized cargo exported through the U.S. that goes through California seaports (30.2%) [Haveman JD et al. 2006 at Table 13.] multiplied by an estimated proportion of exporters' revenue derived from exporting (30%).

86 Total shipping revenues multiplied by the share of world container cargo traffic (297 million TEUs) [Institute of Shipping Economics and Logistics. "World seaborne container trade and port traffic." *Shipping Statistics & Market Review* (June 2005). http://www.isl.org/products_services/publications/pdf/COMM_6-2006-short.pdf, that is processed by California ports (15 million TEUs) [Haveman JD et al. 2006 at 25] in 2004.

87 Total rail revenues multiplied by California's economy as a share of aggregate U.S. economy (13%), [Haveman JD et al. 2006 at 3].

88 Cargo processed by California airports (3.7 million tons) as a percent of total cargo processed in U.S. in 2005.(30.9 million tons) [Airports Council International. "Stats & Surveys, Traffic." For total cargo summary: http://www.aci-na.org/asp/traffic.asp?page=133. For total cargo spreadsheet: http://www.aci-na.org/docs/2005%20Final%20Cargo%20Ranking.xls.]

89 We calculate Wal-Mart's revenues dependent on freight transport through California to be approximately $70 billion, based on the following: Total U.S. revenues ($250 billion, which is total revenues of $312.4 billion minus international revenues of $62.7 billion [taken from Wal-Mart website: http://walmartstores.com/GlobalWMStoresWeb/navigate.do?catg=371]) multiplied by 46.9% (California's share of all containerized cargo imported into the U.S.), multiplied by 60% (the share of Wal-Mart's retail products that are imported).

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Palaniappan M et al. "Deluged by Diesel: Healthy Solutions for West County." Pacific Institute. 2005. http://www.pacinst.org/reports/west_county_diesel.

Bay View Hunters Point Community Advocates
Healthy San Leandro Collaborative
Merced Alliance for Responsible Growth Walmart Action Team
Shafter Association of Irritated Residents
Wilmington Coalition for a Safe Environment

This report is available on-line at www.pacinst.org/reports/freight_transport

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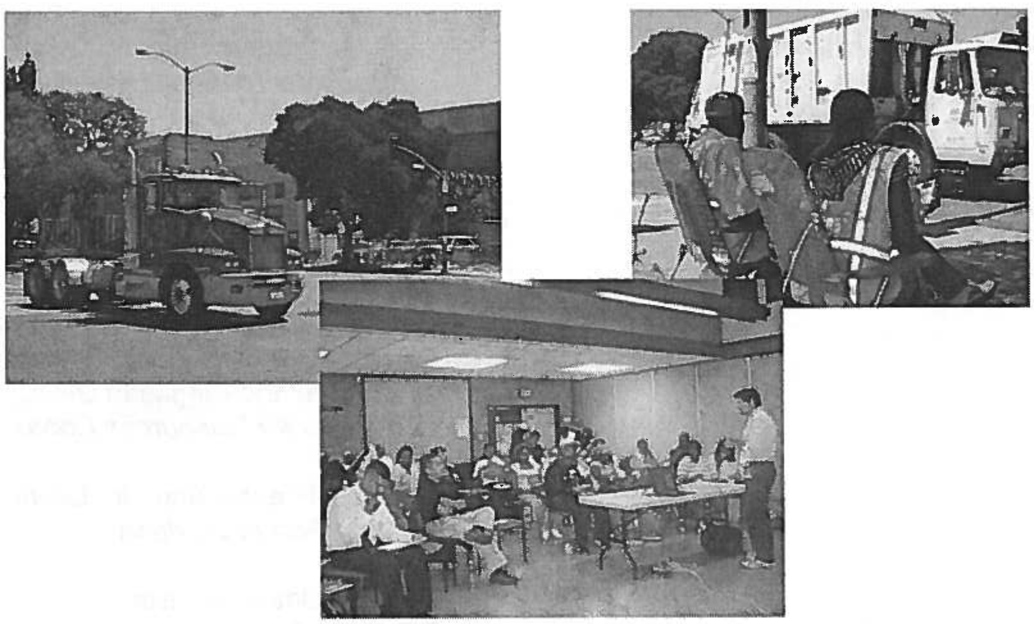
WEST OAKLAND TRUCK SURVEY



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BAY AREA AIR QUALITY MANAGEMENT DISTRICT

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EXECUTIVE SUMMARY

A. Introduction

West Oakland is situated adjacent to the Port of Oakland, bounded by three major freeways (I-580, I-880, and I-980), and home to a major U.S. Postal Service Distribution Center. During the fall and winter of 2008, the Bay Area Air Quality Management District (the District) in partnership with Sonoma Technology, Inc (STI), Wiltec, and the West Oakland Environmental Indicators Project (WOEIP) developed and implemented a truck-traffic survey in West Oakland. The study was initiated to address uncertainties raised in the Health Risk Assessment (HRA) conducted by the California Air Resources Board (CARB) in 2008 to assess health risks from diesel exhaust in the West Oakland community (Diesel Particulate Matter Health Risk Assessment for the West Oakland Community). The risk assessment reported that West Oakland residents are exposed to high concentrations of diesel particulate matter—almost three times higher than the average background levels in the Bay Area—and that the largest source of risk (71%) is attributed to truck traffic. However, the study noted that there were significant uncertainties associated with (1) estimates of truck volumes and routes in West Oakland and (2) estimates of the percentage of truck traffic (and therefore emissions and risk) attributable to activity at the Port of Oakland. The HRA concluded that the:

"data limitations may have led to potential overestimate of overall trucking emissions within the modeling domain and a potential underestimate of the overall fraction of trucking emissions that are attributable to the Port of Oakland."

A major goal of this study was to reduce these uncertainties in order to apportion the health risk to the appropriate source by estimating:

- the volume of medium heavy-duty (MHD) and heavy heavy-duty (HHD) truck traffic on the freeways and surface streets of West Oakland;
- the primary routes of truck travel;
- the locations and duration of truck idling activity;
- the vehicle miles travelled for trucks within the study area;
- the age distribution of trucks in West Oakland; and
- the fraction of trucks transporting goods and passing through West Oakland in services related to the Port of Oakland (Port).

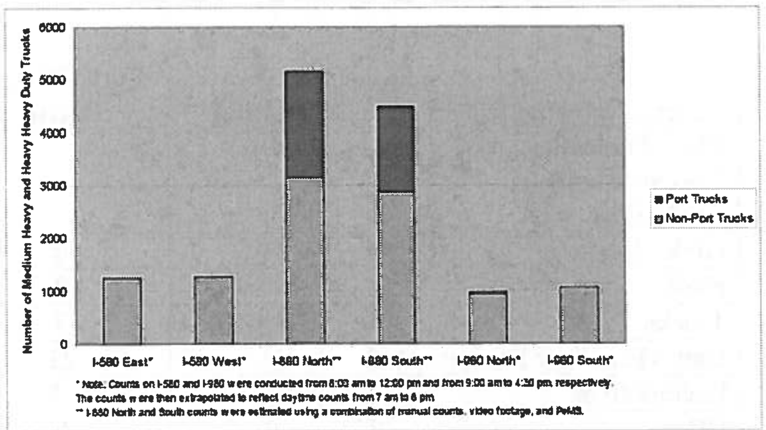
To achieve these goals, the District collaborated with the members of the West Oakland community to survey surface streets and estimate traffic volumes, routes, and speeds of medium heavy duty and heavy heavy duty trucks along surface streets and freeways in West Oakland in order to improve the spatial representation of roadway emissions and differentiate the contribution of Port versus non-Port trucks. Select local businesses were also surveyed regarding their idling activity and truck licenses were recorded to develop a current truck age distribution for West Oakland. The HRA assumptions were then compared to the survey results and health risks were adjusted accordingly to derive new risk estimates that approximately reflect the findings of this survey.

B. Key Findings

The key findings drawn from the study and subsequent analysis are:

- The District estimated that 7,200 trucks (medium heavy duty and heavy heavy duty) travel daily on surface streets through West Oakland from 7:00 am to 6:00 pm. Of these trucks, 51% or 3,700 are Port-related trucks.
- As shown in the Figure ES-1, the daily freeway volumes on I-880 from 7:00 am to 6:00 pm is approximately 9,700 trucks with 37% of them being Port related. Conversely, I-580 and I-980 had about 2,100 to 2,600 trucks travel daily during the same hours with one to two percent classified as Port trucks.

Figure ES-1. Estimated Freeway Volumes Based on Survey



- The District estimated daily vehicle miles traveled (VMT) by all trucks in West Oakland to be 7,900 (7:00 am to 6:00 pm). Port trucks had an estimated VMT of 3,050 during that period.
- Idling survey responses, confirmed through curbside observations, indicated that a majority of local businesses are complying with the five minute idling restriction required by CARB regulations.
- The median and average model year for all trucks and diesel-powered trucks identified during the West Oakland truck survey was 1997, which is consistent with the Port's revised 2005 Seaport Air Emissions Inventory Report (ENVIRON, 2008). Approximately 85% of the trucks had model year of 1994 or newer. 49% of the trucks were registered in the Bay Area; 27% were registered in non-Bay Area California cities; and 24% were either registered out of state or no longer in use since the data were recorded.

When these findings were compared to assumptions used in the HRA, the survey concurred with the HRA regarding the age distribution, average speed, and idling activity. The survey also confirmed suspicions raised in the HRA that the overall trucking emissions were potentially overestimated and the fraction of trucking emissions attributed to the Port of Oakland was underestimated. The main differences in traffic volumes found between the two studies are that:

- The survey found significantly fewer trucks on surface streets, but a higher percentage of Port trucks;
- The survey counted fewer trucks on freeways I-980 and I-580; and
- The survey estimated a higher number of Port and non-Port trucks on freeway I-880.

Some of the discrepancies may be attributed to differences in survey methods and assumptions used when identifying a truck as a Port truck. However, methodological differences do not bridge the gap between the two study results. In order to quantify the impact these changes have on the health risk for West Oakland, the District performed calculations that adjusted the health risk in the HRA by the survey results. The adjusted risks are shown in Table ES-1.

Table ES-1. Summary of the Adjusted Population Weighted Cancer Risks (Cases per Million) Based on the Survey

Source Category	Part I Port	Part II Union Pacific	Part III Non-Port and Non-UP	Combined
OGV Transiting, Maneuvering, and Anchoring	57	0	23	80
OGV Hoteling	57	0	10	67
Harbor Craft	15	0	78	93
Trucks	**103** (42)	7	**415** (795)	**525** (844)
Cargo Handling Equipment	16	21	7	44
Locomotives	4	15	37	56
Others	0	0	2	2
Total	**252** (192)	43	**572** (951)	**867** (1,186)
% Risk	**29%** (16%)	**5%** (4%)	**66%** (80%)	100%

Note: Revised risks are noted in bold text. The values in parentheses ( ) are the original population-weighted cancer risks presented in Table 7 of the HRA.

The adjusted risk suggests:

- The Port's contribution to the population weighted risk for West Oakland is significantly higher than the 16% attributed in the HRA. While this study did not re-run modeling of risk calculations, survey findings suggest the Port contribution to the health risk is about 29%.
- Conversely, the population weighted risk from trucks not associated with the Port or the Union Pacific railyard decreased to 415 cases in a million. Likewise, the risk from all trucking operations decreased from 844 cases in a million to 525 cases in a million.
- Port trucking operations become the highest contributor to the overall risk from Port activities, as shown in Figure ES-2.
- Trucks remain the single highest sources of diesel emissions in West Oakland, responsible for 61% of the population weighted risk, as shown in Figure ES-3.

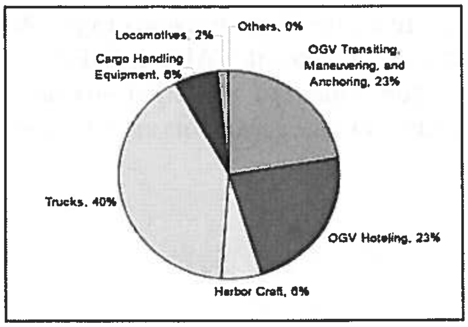


Figure ES-2. Percent Contribution to Adjusted Cancer Risk from Port Sources

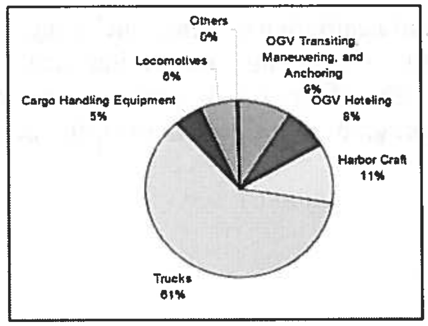


Figure ES-3. Percent Contribution from All Diesel Sources to the Adjusted Cancer Risk

The revised risk estimates indicate an increased population-weighted risk from Port trucks. This finding is not a reflection of changes since the HRA—indeed the Port has experienced a decline in vessel calls and cargo shipments since the HRA was conducted. Rather the finding is a reflection of additional data which show, as was asserted in the HRA, that the trucking operations data for West Oakland in the HRA likely underestimated the Port's contribution.

C. Conclusions

The survey findings confirm and support the conclusions presented in the HRA and further demonstrate that the residents of West Oakland are exposed to unhealthful levels of diesel particulate matter emissions. The revised risk estimates showed a 13% increase in population weighted cancer risk from Port trucks and a corresponding decrease of 14% in the cancer risk attributed to non-Port and non-Union Pacific activities. Overall, the revised risk from all trucking operations decreased from 844 cases in a million to 525 cases in a million. Truck emissions are the single highest source of diesel emissions in West Oakland; compliance with regulations adopted by CARB is an essential mitigation strategy. The Port also has a significant role to play in reducing these emissions. The contribution of Port-related activities to the total cancer risk in West Oakland increased to 29%, with Port trucks being the highest contributor. More collaborative initiatives with CARB and the District will help in reducing these emissions. The study findings show some important progress has been made: local businesses are complying with the idling regulation and older, higher polluting truck engines are being phased out. The Port has also adopted a resolution to ban trucks older than 1994 from entering terminals.

The adjusted health risk indicates that the District's initiative to focus incentives and grants funding in this area should have a significant impact in improving the air quality in West Oakland. The District also will continue to support outreach efforts to businesses to curb idling and support efforts by Alameda County and the Port of Oakland to move truck services and offer long term parking on Port property. All of these measures are steps in the right direction.

These recommendations alone will not achieve the emission reductions required to sufficiently improve health conditions in West Oakland. The District has initiated a Clean Air Communities Initiative program that includes a multi-pronged approach to improve air quality for impacted communities such as West Oakland. The program uses a variety of strategies including targeted regulations, focused grant and incentive funding, outreach and communication to community, businesses, and health departments, including air quality in critical land use decisions to protect current and future residents, monitoring local sources, and enforcement of CARB and District regulations. The District will continue to work on additional emission reduction strategies through this program to reduce the potential health risk associated with diesel emissions in West Oakland.

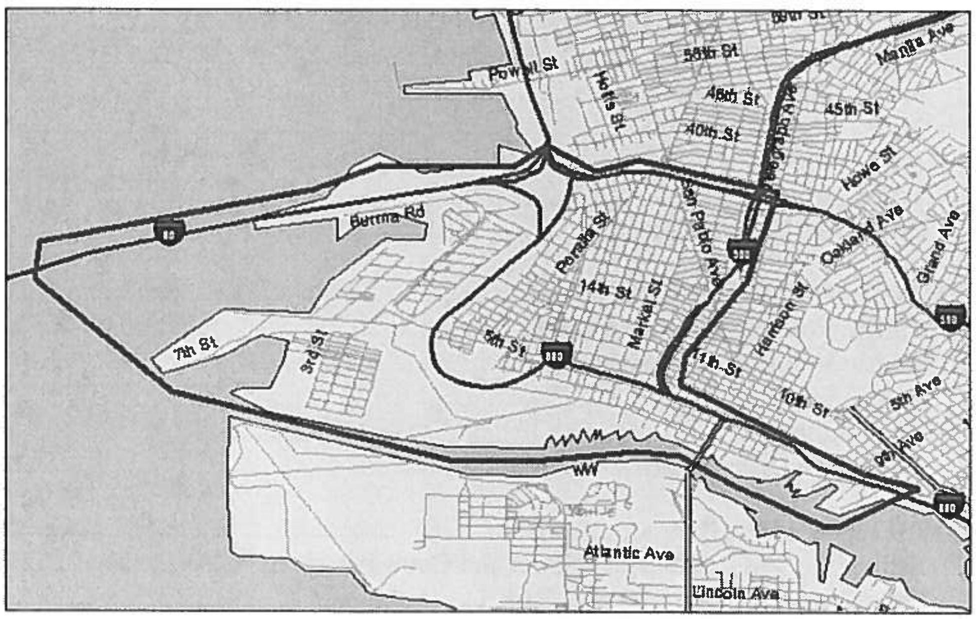
TABLE OF CONTENTS

1. INTRODUCTION

1.1 BACKGROUND

West Oakland, one of the oldest districts in Oakland, is home to about 22,000 residents (see Figure 1 for the approximate boundaries of the study region outlined in blue). The neighborhood is adjacent to the Port of Oakland and is bounded by three major freeways (I-580, I-880, and I-980). The Port of Oakland is the 5th largest container seaport in the United States. The Port operates over 13 container terminals and received 1,928 cargo vessels in 2008. In addition, West Oakland is home to a major U.S. Postal Service distribution center and a number of other truck-based businesses. As a result, significant numbers of diesel-fueled trucks travel through West Oakland on a daily basis, raising concerns about emissions of diesel particulate matter—a pollutant the Office of Environmental Health and Hazards Assessments (OEHHA) has identified as a toxic air contaminant based on its potential to cause cancer and other adverse health effects.

Figure 1. Blue line shows approximate boundaries of the West Oakland study region.



The Bay Area Air Quality Management District (the District) initiated the Community Air Risk Evaluation (CARE) program in 2004 to identify locations with high levels of risk from ambient toxic air contaminants (TAC) and locations with sensitive populations and use the information to help focus risk reduction activities. The District developed an inventory of TAC emissions that was combined with demographic and heath indicator data (BAAQMD, 2006) to identify areas with relatively high risk and sensitive populations. Population statistics of youth, seniors, and low-income families were mapped in combination with TAC emissions. This mapping analysis identified West Oakland as being one of the most highly impacted communities within the San Francisco Bay Area. Diesel particulate matter (diesel PM), emitted from on-road and off-road diesel engines, contributed the majority (over 85%) of the cancer-risk weighted emissions totals.

Diesel PM is composed of soot and is a known health hazard. Exposure to diesel PM has been linked to respiratory illnesses and increased risks of heart disease and lung cancer. Children and the elderly are especially vulnerable to the effects of diesel PM.

To evaluate the impacts of diesel emissions on the West Oakland community, California Air Resources Board (CARB) conducted a health risk assessment (HRA) in collaboration with the District and the Port of Oakland. Data on diesel activity in West Oakland was provided by CARB and the District as well as the Port of Oakland and the Union Pacific Railroad. The purpose of the study was to quantify diesel particulate matter (PM) emission impacts under current and future activity levels at the Port of Oakland, Union Pacific Railyard, local freeways, and other sources of diesel emissions.

The resulting summary report, entitled "Diesel Particulate Matter Health Risk Assessment for the West Oakland Community" (CARB, 2008) concluded that approximately 71% of the risk from diesel particulate matter in West Oakland was produced by on-road heavy-duty trucks. The report found that the West Oakland community is exposed to diesel PM ambient concentrations that are almost three times the average background diesel PM ambient concentrations in the Bay Area. CARB reported that the data in the truck inventory used to make the emission estimates were limited and resulted in large uncertainties in the estimate of trucking emissions within West Oakland. CARB states that the data limitations may have lead to potential overestimate of overall trucking emissions and a potential underestimate of the overall fraction of trucking emissions that are attributable to the Port of Oakland. One of the recommendations of the HRA report was that "[t]he BAAQMD should continue working with the community and the Port to implement its studies of trucking operations in the West Oakland community."

To refine the truck traffic data cited in the report, the District in collaboration with its consultants and community members implemented this study, a comprehensive truck survey designed to count the number of trucks attributed to Port and non-Port activities. The main goal of this study was to improve the accuracy of the roadway emissions estimates by conducting a field survey that recorded the truck traffic patterns and idling activities in West Oakland. The results of this survey were then compared to estimated truck activity data used in the HRA to determine the uncertainty associated with the risk estimates. The results will also support ongoing outreach in the community to address ways to reduce diesel PM exposures. This study was completed through a collaborative effort with staff from the District, Sonoma Technology, Inc. (STI), Wiltec, and the West Oakland Environmental Indicators Project (WOEIP).

1.2 OBJECTIVES

The main goal of this study was to improve the accuracy of diesel PM emissions estimates from on-road trucks in West Oakland. To achieve this goal, the West Oakland truck field survey was designed to collect data on trucks and their activities in and around the Port and within the West Oakland community. The specific objectives of the study were to:

- Improve the estimates of volumes, by time of day and day-of-week, of medium-heavy-duty (MHD) and heavy-heavy-duty (HHD) truck traffic on the freeways and surface streets of West Oakland;

- Estimate the speeds of trucks on individual roadways;
- Identify the primary routes of truck travel and improve the spatial representation of trucks within West Oakland;
- Determine the locations and duration of truck idling activity;
- Estimate the vehicle miles travelled (VMT) for trucks on local roadways within the study area,
- Estimate the age distribution of trucks in West Oakland;
- Evaluate the fraction of trucks transporting goods and passing through West Oakland in services related to the Port on freeways and surface streets;
- Engage the community in assisting with the study and continue outreach to improve the air quality in West Oakland.

The work completed for this study used a variety of survey methods to gather information in support of these objectives. The information gathered was used to refine the estimates of potential health risks from diesel PM emissions from on-road trucks and to improve estimates of the portion of risk attributed to Port-related activities. The work produced from this study will be used in ongoing efforts to reduce the health risks associated with diesel emissions in the West Oakland community.

1.3 STUDY OVERVIEW

The District identified four distinct tasks to be completed as part of this study in order to meet the study's objectives. The specific tasks completed in this study include:

- Task 1 – Survey local streets and estimate traffic volumes, routes, and speeds of MHD and HHD trucks along surface streets and freeways in the West Oakland study area in order to improve the spatial representation of roadway emissions and differentiate the contribution of Port versus non-Port trucks;
- Task 2 – Verify previously surveyed truck idling locations and interview additional truck-related businesses in the West Oakland study area to gather information on the time of day that trucks idle and the length of time spent idling;
- Task 3 – Collect license data for developing a truck age distribution to refine truck emission estimates; and
- Task 4 – Compile survey data from Task 1 to compare with on-road truck estimates used in the HRA for both Port-related and non-Port-related activity. This task includes an analysis of truck routes and VMT on local streets.

Section 1.4 presents the previous studies that were used in developing the field protocol and for collecting the data. Section 2.0 describes, in more detail, the data collection efforts (Tasks 1-3) performed by this study. The District partnered with community groups to manually count trucks along specific traffic intersections in West Oakland in order to estimate the number of trucks by hour and day of week and types of trucks. The study focused on characterizing activity of medium HD and heavy HD trucks. Light heavy duty (LHD) trucks such as sports utility vehicles and pickup trucks were not included in this study because although they contribute to the overall VMT, a majority of the vehicles run on gasoline and not diesel. Emissions from LHD vehicles were so low that they contributed less than one percent of the total emissions from all diesel vehicles from both surface streets and freeways. Counters were also trained to distinguish between Port versus non-Port trucks. In conjunction with the manual counts, counters captured license plate data to develop a truck age distribution. Automatic counters were installed along key intersections to develop daily 24 hour representation of traffic volumes and speeds and discern weekday versus weekend traffic patterns. The District also verified idling activity by re-interviewing previously surveyed local truck businesses as well as surveying businesses that were not previously included in any survey. Section 3 presents analysis methods for interpreting the data collected from Tasks 1-3. Section 4 summarizes the findings and compares the results to HRA assumptions (Task 4). While the HRA model was not rerun, Section 5 applies the truck-traffic study findings to generate approximate adjusted risk estimates. Section 6 summarizes the study findings and conclusions.

1.4 PREVIOUS WEST OAKLAND STUDIES

Several truck studies have been conducted previously in West Oakland. The following section presents short descriptions of studies that were most relevant and assisted in developing this study's protocol.

During a 2001 diesel particulate matter emissions study for the City of Oakland, emission estimates were prepared for diesel trucks operating at the Port of Oakland, on freeways, and at truck-related businesses in West Oakland (Harding ESE, 2001). Surveys were used to collect truck trip data for 45 truck-related businesses in West Oakland, and it was estimated that these businesses were generating about 2,500 truck trips per day. Traffic count data from the California Department of Transportation (Caltrans) were used to estimate emissions from freeway truck traffic.

One of the most comprehensive studies was conducted by TIAX LLC in September 2003 for the Pacific Institute on behalf of WOEIP (TIAX, 2003). The WOEIP Report by the Pacific Institute in conjunction with the Coalition for West Oakland Revitalization was supported through a US EPA grant. As part of the study, TIAX trained community members to conduct the truck count and idling study, focusing on container trucks servicing the Port of Oakland.

In the WOEIP report, nine locations (see accompanying Table 1 and Figure 2) representing high truck traffic intersections were surveyed for up to three days. Surveyors collected data on six categories of trucks: container semi-trailer trucks (2-axle cab), container semi-trailer trucks (3-axle cab), non-container semi-trailer trucks (2-axle cab), non-container semi-trailer trucks (3-axle cab), cabs only (2-axle), and cabs only (3-axle). These counts included typical Port trucks as well as US Postal truck-trailer rigs. Other vehicles such as box trucks, pickup trucks, and vans were excluded from the study. In addition to counting the axles on the trucks, surveyors also noted the direction of travel for each vehicle as it passed through the intersection.

The WOEIP report estimated that approximately 6,300 trucks per day enter the Port of Oakland through local streets in West Oakland. Approximately 290 trucks visited West Oakland for basic services such as fuel, truck repair, food and beverages, and overnight parking. Although several of the streets that were surveyed prohibited truck travel, the survey found that about 40 trucks per day illegally travelled through these streets. The report also estimated that truck drivers spend up to four hours idling at the Port terminals while delivering or picking up containers.

Table 1. WOEIP Report (TIAX, 2003) Survey Locations

Location	Manual Counts
7th Street and I-880 Frontage Road	3-day survey
7th Street and Mandela Parkway	3-day survey
West Grand Avenue and Mandela Parkway	3-day survey
7th Street and Adeline Street	1-day survey
11th Street and Wood Street	1-day survey
Goss Street and Wood Street	1-day survey
14th Street and Campbell Street	1-day survey
16th Street and Campbell Street	1-day survey
West Grand Avenue and Campbell Street	1-day survey

The report offered some possible mitigation measures to reduce the diesel PM emissions generated from the transport of goods and idling at Port terminals including dedicated truck services on Port property, subsidized repowering/replacing of old truck engines, and installation of road barriers.

In a more recent study, the City of Oakland Public Works Agency conducted a truck-following study and analyzed 24-hour vehicle axle classification machine counts and manual intersection turning movement counts (Dowling Associates, 2006). The purpose of the study was to gather data on goods movements and truck traffic through eleven key intersections at the Emeryville/Oakland border. Table 2 presents a summary of the locations that were chosen for the City's Phase I priority list of locations in West Oakland while Figure 2 graphically depicts the sampling locations.

The focus of the study was to count the number of articulated trucks (i.e., vehicles with detachable trailers) that have three to seven axles used to transport goods to and from Oakland and Emeryville. Non-articulated trucks such as delivery trucks were not counted in the survey. Manual intersection turning movement counts were then conducted at eight of the survey locations during peak morning, noon, and afternoon hours. Three of the locations were not surveyed due to the low truck volumes revealed during the automatic machine counts. Lastly, Dowling Associates performed a truck following survey where they randomly followed articulated trucks within the boundaries of 40th Street, San Pablo Avenue-I-980 freeway, 16th Street, and Wood Street/Beach Street. The surveyor documented the start and end times of the truck following, number of axles, number of trailers, and truck route.

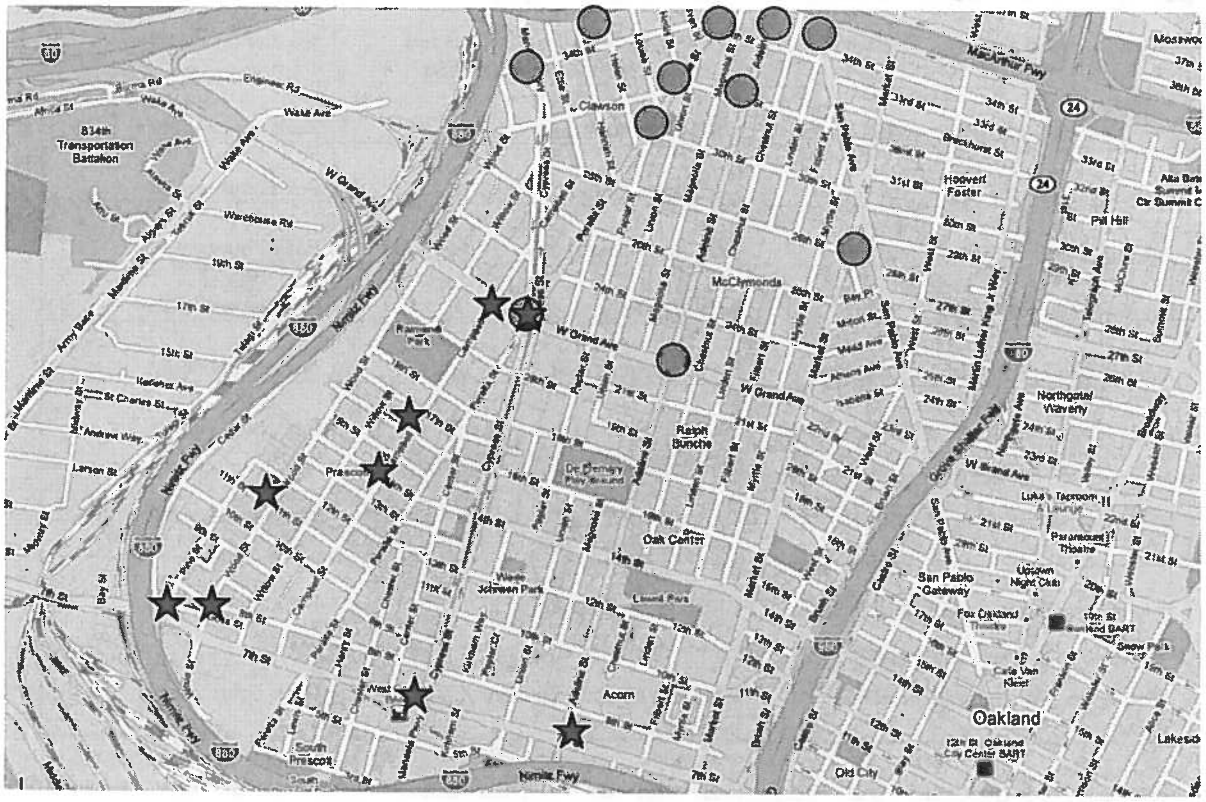
Table 2. City of Oakland (Dowling Associates, 2006) Study Survey Locations

Location	Machine Count	Manual Count
Mandela Parkway north of 34th Street	All lanes counted	Peak hours count
Adeline Street south of 35th Street	Lane closest to the curb was not counted due to lack of median.	No manual count
San Pablo Avenue south of 35th Street	All lanes counted	Peak hours count
Hollis Street north of 34th Street	All lanes counted	Peak hours count
Peralta Street south of 35th Street	All lanes counted	Peak hours count
Peralta Street south of 32nd Street	All lanes counted	Peak hours count
Adeline Street south of 32nd Street	All lanes counted	No manual count
Poplar Street south of 30th Street	Lane closest to the curb was not counted due to lack of median.	Peak hours count
Market Street south of 28th Street	Lane closest to the curb was not counted due to lack of median.	No manual count
West Grand Avenue east of Mandela Parkway	Middle lane not counted	Peak hours count
West Grand Avenue east of Adeline Street	Middle lane not counted	Peak hours count

The City of Oakland study concluded that most of the articulated truck activity is constant throughout the day from 8:00 am to 4:00 pm and, based on the truck-following survey, that most of the trucks used local streets in West Oakland for transporting their goods within the study area. The study followed 48 articulated trucks and found that a majority of the trucks traveling on local streets in West Oakland had origins or destinations within the study area. About 10% of local truck movements observed in the manual counts were from trucks transporting goods solely between Oakland and Emeryville.

One City of Oakland survey location corresponded to the same location where data was collected by community members for the WOEIP report. The intersection of West Grand Avenue and Mandela Parkway is heavily used by trucks going eastbound or westbound on West Grand Avenue. The City of Oakland study measured 271 articulated trailers passing through the intersection within a 24 hour period with approximately 180 of the trucks traveling from 6:00 am to 2:00 pm. Under similar conditions, the WOEIP reported 131 container trucks, 306 non-container trucks, and 131 cabs that traveled through the intersection from 6:30 am to 2:30 pm. There are several reasons that may account for the differences in the counts of container trucks (180 versus 131) between the two studies. The City of Oakland survey counted more types of trucks than the WOEIP survey and used automatic counters that are less reliable at classifying trucks based on the number of axles (see Appendix B). In addition, the difference in counts is consistent with weekday variability that was determined through this study (see Section 3.1.2).

Figure 2. WOEIP Report (TIAX, 2003; red stars) and City of Oakland (Dowling, 2006; blue circles) Survey Locations



The Port of Oakland has sponsored various truck studies including a recent pilot study with the Bay Area World Trade Center (Bay Area World Trade Center, 2007). In the pilot study, the activity of 300 truck drivers representing 14 truck companies that serviced the Port from 2006 to 2007 was tracked using global positioning system (GPS) units in the driver's cell phones. The objective of the Port truck tracking study was to increase efficiency and utilization of the appointment system thereby improving goods movement through the Port, reducing Port and regional congestion, and improving air quality.

GPS units transmitted the truck speed and the longitude and latitude locations every two minutes. District staff compiled all the GPS data within West Oakland and presented the results in Figure 3. Each two minute count was represented by a yellow square of 25 meters in length. As more counts overlapped, darker colors were used. Yellow represented two to 20 counts, orange represented 20 to 2,500 counts and red represented 2,500 to 100,000 counts. The red highlighted locations are representative of heavy traffic or overnight parking areas. Two of the frequently used locations are public scales and one is a truck repair business. The truck routes referenced in Section 4.0 were derived from data collected by the GPS trucking study.

Figure 3. Port of Oakland GPS Truck Tracking Study (2006-2007)

Note: the darker shades of yellow to orange areas represent longer residence times of trucks or higher density of trucks.

In 2007, STI was contracted by the District to develop a complete inventory of diesel sources associated with truck-related businesses and construction projects within the boundary of West Oakland. STI and District staff conducted a survey of truck-based businesses in West Oakland to estimate truck trips and idling times at each facility (Reid, 2007). That study identified 52 truck-based businesses in West Oakland and estimated that these businesses generated almost 3,000 daily truck trips in the neighborhood. The report estimated that the total daily truck activities at truck-based businesses in West Oakland was approximately 3,000 diesel truck trips per day on any given weekday based on survey responses from these businesses. However, the data were insufficient to address most of the objectives of this study and thus, further data collection was deemed necessary to understand truck traffic patterns and idling activities in West Oakland.

Following up on the mitigation measures recommended in the WOEIP report, the Alameda County Congestion Management Agency (ACCMA) sponsored a survey (Tioga Group and Dowling Associates, 2008) to question truck drivers on their selection of parking locations. The survey was completed in January 2008. Truck drivers typically park on public streets to make early morning deliveries, to access services, to wait until freeways are less congested, or for mandatory rest periods. Several communities have regulations prohibiting overnight truck parking on city streets, but leave no suitable alternative for truck parking. The purpose of the study was to determine where truck drivers parked, how long they parked, and if they would use a dedicated truck parking location if it were available.

The survey consisted of 179 face-to-face interviews at known truck parking locations. At the time of the interview, most of the trucks were stopped for less than 30 minutes waiting to receive their cargo, resting, or gathering additional instructions from their dispatcher. Many of the drivers stopped at a particular location because it was an available truck stop or it was closest or the most convenient location to their next pickup. Many of the trucks were affiliated with truck companies outside of the Bay Area and consequently did not have a working terminal or yard in which to park. The study determined that given the opportunity to overnight at truck stop, only truck drivers that domicile outside of the Bay Area would use a full service facility, while Bay Area drivers prefer to return to their normal, permanent parking locations. The most desirable parking locations were determined to be in East Oakland, Hayward, and San Leandro, as close to the interstate highway as possible.

In October/November of 2008, the Port of Oakland conducted a Drayage Truck License Plate Field Survey (Port of Oakland, 2008) by collecting license plate data from trucks entering or leaving terminal gates. Several terminal operators also collected license plates at their specific terminals. The data were compiled to develop an age distribution of Port trucks transporting goods to and from the Port of Oakland. A comparison of the results from Port terminal to the age of trucks estimated from this study is discussed in Section 4.5.

These studies highlight the significant volumes of diesel truck traffic in West Oakland and the difficulty in understanding their activity and travel patterns in order to develop effective emission reductions strategies. The intent of this study is to better characterize truck activities by estimating the volume and distance traveled by trucks in this neighborhood. In so doing, this would assist in estimating diesel PM emissions and assessing the health risks associated with those emissions.

2. DATA COLLECTION TASKS AND TRUCK SURVEY PROTOCOL

The goals of this survey were to assess diesel truck activity in West Oakland and estimate the number of trucks by hour and day of week, their types, ages, idling behaviors, and average speeds. In addition, the study estimated the number of Port versus non-Port trucks traveling along freeways and surface roads and the number of Port and non-Port trucks entering and exiting West Oakland each day. Each truck that crossed a surveyed intersection was counted. It is possible that a truck, on a single trip, passing surveyed intersections could be counted more than once. This study focused on estimating truck volumes on surveyed roadways and not on estimating the number of "truck trips."

The specific data-collection tasks completed in this study include:

- Task 1 – Survey local streets and estimate traffic volumes, routes, and speeds of MHD and HHD trucks along surface streets and freeways in the West Oakland study area in order to improve the spatial representation of roadway emissions and differentiate the contribution of Port versus non-Port trucks;
- Task 2 – Verify previously surveyed truck idling locations and interview additional truck-related businesses in the West Oakland study area to gather information on the time of day that trucks idle and the length of time spent idling; and
- Task 3 – Collect license data for developing a truck age distribution.

This section presents the general protocol for completing each of the three data-collection tasks, including information on the sampling frequency, station locations, and identification of specific trucks. The majority of the work was completed by STI with guidance from the District and support from a subcontractor, Wiltec, and community members organized by WOEIP. Analysis of data collected in support of these tasks is described in Section 3. The final Task 4 of compiling the survey data and comparing it to the on-road truck estimates used in the HRA for both Port-related and non-Port related activities is presented in Sections 4 and 5.

2.1 TASK 1: ESTIMATE TRAFFIC VOLUMES AND SPEEDS

The purpose of Task 1 was to estimate the truck traffic on local streets, major roadways, and freeways using manual and automatic counters.

2.1.1 Freeway Volumes

West Oakland contains portions of the I-580, I-980, I-880, and I-80 freeways, as well as the eastern span of the Bay Bridge. The focus of the first task was to estimate freeway traffic along the heavily used segment of I-880 north and east of the Port of Oakland and the UP railyard. The District used manual counts, video footage and data from the Freeway Performance Measurement System (PeMS), a joint project of the California Department of Transportation (Caltrans) and the University of California Berkeley, to estimate truck volumes and speeds on this freeway. PeMS processes 30-second loop detector data from freeway segments across

California and provides Caltrans with data to assess the performance of the freeways. The District used the complete sensor data to estimate the total traffic (cars and trucks) traveling through on I-880 by subtracting the number of vehicles exiting or entering the freeway. The District did not use the pre-sorted HHD truck count data available for download on PeMS, but instead estimated percentage of total trucks and Port trucks on each freeway based on the manual counts and video footage.

To estimate the fraction of truck traffic and the truck-fraction associated with Port activity, STI with cooperation from the Bay Area Rapid Transit District (BART) collected video footage of the north and south bound I-880 freeway from the West Oakland BART platform. A portable handheld camcorder was used to record traffic on I-880 on the following dates and times:

- Monday, December 8, 2008 from 7:30 am to 11:30 am
- Wednesday, December 10, 2008, from 1:00 pm to 4:30 pm
- Saturday, December 13, 2008, from 7:30 am to 11:30 am
- Sunday, December 14, 2008, from 7:30 am to 4:30 pm

Video footage was collected in half hour intervals that were alternated with half hour intervals of manual counting from the West Oakland platform. STI staff recorded the number of axles on passing trucks and identified if the truck was associated with Port activity as it traveled on either the northbound or southbound traffic lanes during every 30 minutes of manual counting. Port trucks were identified as having vertical ribs and corner castings on the container (see Section 2.1.2.2). A similar processing procedure was implemented by District staff for each ½ hour of video film. (See Appendix C for details on the analysis using PeMS data with video clips and manual counts to derive truck percentages.)

After the data from I-880 was processed, the District concluded that manual traffic counts on I-980 and I-580 were necessary to characterize activities from all major freeways. No video footage was made of the I-580 and I-980 freeway traffic. Instead, STI manually counted trucks following a similar protocol for I-880 for sections of I-980 and I-580 freeways. Counts were collected for I-580 from the rooftop of the California Hotel at 3501 San Pablo Avenue and for I-980 from the 11th and 12th Street overpasses on the following dates:

- Tuesday, May 5, 2009, from 8:00 am to 12:00 pm – I-580 East and West
- Tuesday, May 5, 2009 from 9:00 am to 12:00 pm – I-980 East and West (12th Street)
- Tuesday, May 5, 2009, from 1:00 pm to 4:30 pm – I-980 East and West (11th Street)

2.1.2 Major and Minor Street Volumes

On roadways other than freeways, traffic data collection methods were employed to estimate truck volumes and speeds by hour, day of week, and season. Locations for data collection activities were determined based on a variety of data sources, including:

- Data collected by community groups during the 2003 Pacific Institute study and other projects.

- Data on truck trips generated by truck-related businesses in West Oakland compiled by STI for the West Oakland HRA.
- Previous truck counts conducted by Dowling Associates, Inc. for the City of Oakland.
- A truck-following survey conducted by STI and District staff on November 29, 2007.
- GPS data from the Port of Oakland's Truck Tracking Survey, which uses GPS technology to track activities of Port trucks.
- Personal communications with West Oakland community members.

These data sources were used to identify the 38 locations that were manually surveyed for this study. Table 3 lists the survey locations (Figure 4), reason for selecting the location, and the survey duration. Four survey locations represent the main arterial roads leading to the Port of Oakland: (1) Maritime Avenue/West Grand Avenue, (2) 7th Street/I-880 Frontage Road, (3) Adeline Street/3rd Street, and (4) 3rd Street/Market Street. From these roadways, trucks transport goods through the West Oakland community and have freeway access to Interstate 80 (north and eastbound), Interstate 880 (southbound), Interstate 580 (eastbound), and Interstate 980 (eastbound). Thirteen survey locations were selected within West Oakland that correspond to major arterial roadways frequently used for goods movement. An additional 16 locations were surveyed along the perimeter of West Oakland to estimate the number of trucks that daily enter and exit the area. Surveys were also conducted on five minor streets in close proximity to schools, parks, recreational centers, and on truck restricted roads.

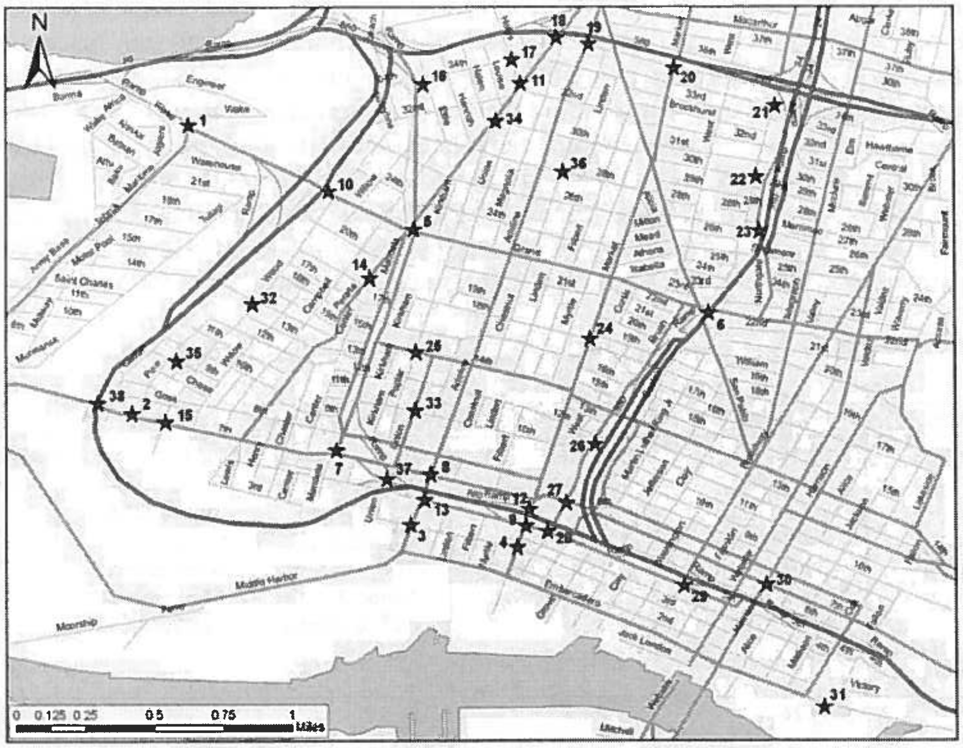
In addition to the manual counts, Wiltec deployed four automatic vehicle classification counters co-located with manual survey locations to evaluate the manual counts and provide an overall estimate of the traffic volume, vehicle type, and vehicle speeds. The automatic counters provided continuous counts for a longer period than was practical with a manual survey. The four locations represent two high traffic locations (3rd Street/Adeline Street and Mandela Parkway/West Grand Avenue), one moderate traffic location (Market Street/18th Street), and one low activity street (30th Street/ Martin Luther King Drive).

Two types of counters were used. The vehicle classification counters that identify the type of trucks can only be deployed across a single lane of traffic, while the more commonly used total vehicle counters can be used over multiple lanes. For three lane roadways such as West Grand Avenue, vehicle classification counters were set up on the two outside lanes while a third vehicle counter was set up to capture total traffic volumes across all three lanes. The vehicle count on the middle lane was estimated by subtracting the individual counts yielded from the two outside lanes from the total volume count of all three lanes. Because vehicle classification counts were not available from the middle lane, the fraction of trucks traveling on the two outside lanes was used to estimate the number of trucks traveling on the middle lane per hour. The counters recorded vehicles 24 hours a day for five consecutive days from August 19 through 23, 2008, to estimate truck volumes by hour and day of week.

Table 3. Survey Locations

Survey Number	Street Name	Reason	Survey Frequency	Automatic Counter
1	Maritime and West Grand Avenue	Port entrance/exit	3 days	
2	7th Street and Frontage	Port entrance/exit	3 days	
3	3rd Street and Adeline Street	Port entrance/exit	3 days	X
4	3rd Street and Market Street	Port entrance/exit	3 days	
5	Mandela Parkway and West Grand Ave	Major intersection	2 days	X
6	San Pablo Avenue and West Grand Ave	Major intersection	2 days	
7	7th Street and Mandela Parkway	Major intersection	2 days	
8	7th Street and Adeline Street	Major intersection	2 days	
9	5th Street and Market Street	I-880 ramp	2 days	
10	Frontage and West Grand Avenue	I-80 ramp	1 day	
11	Hollis Street and Peralta Street	Significant truck traffic	1 day	
12	6th Street and Market Street	I-880 ramp	1 day	
13	5th Street and Adeline Street	I-880 ramp	1 day	
14	18th Street and Peralta Street	Significant truck traffic	1 day	
15	7th Street and Wood Street	Post office	2 days	
16	Mandela Parkway and 34th Street	Perimeter entrance	½ day	
17	Hollis Street and 34th Street	Perimeter entrance	½ day	
18	Peralta Street and 35th Street	Perimeter entrance	½ day	
19	Adeline Street and 35th Street	Perimeter entrance	½ day	
20	Market Street and 35th Street	Perimeter entrance	½ day	
21	Martin Luther King Drive (MLK) and 34th Street	Perimeter entrance	½ day	
22	30th Street and MLK	Perimeter entrance	½ day	X
23	27th Street and Northgate Avenue	Perimeter entrance	½ day	
24	Market Street and 18th Street	Perimeter entrance	½ day	X
25	14th Street and Poplar Street	High activity street	½ day	
26	12th Street and Brush Street	Perimeter entrance	½ day	
27	7th Street and Brush Street	Perimeter entrance	½ day	
28	6th Street and Brush Street	Perimeter entrance	½ day	
29	5th Street and Broadway Street	Perimeter entrance	½ day	
30	7th Street and Harrison Street	Perimeter entrance	½ day	
31	Embarcadero and Fallon Street	Perimeter entrance	½ day	
32	Wood Street and 14th Street	Alternative access to Port	½ day	
33	10th Street and Union Street	Proximity to schools	½ day	
34	Poplar Street and 30th Street	Proximity to schools	½ day	
35	9th Street and Pine Street	Truck restricted road	½ day	
36	Chestnut Street and 28th Street	Proximity to schools	½ day	
37	5th Street and Union Street	I-880 ramp	1 day	
38	7th Street and I-880 (Southbound)	I-880 ramp	1 day	

Figure 4. Surveyed Locations



Note: Plot numbers correspond to survey numbers listed in Table 3.

2.1.2.1 Manual Survey Procedures

For the manual counts, survey teams were posted at selected locations including arterials roads leading to the Port of Oakland, main arterial roadways, and surface streets within the West Oakland community. Survey teams consisted of Oakland residents recruited by the WOEIP and trained by STI and Wiltec to identify trucks and use the survey sheets (Appendix A). Counters were required to have a high school degree, possess a valid California driver license or identification card, and be at least 21 years of age. Each team, consisting of two people, conducted hourly truck counts at each survey location recording the truck movement at the intersection and the number of truck axles. District staff also participated in the manual counts by auditing counts at high traffic locations to estimate the margin of error of counts for statistical purposes.

Survey sheets also allowed counters to further categorize trucks as bobtails (truck power unit without chassis or trailer), chassis (power unit hauling a chassis without a container) or a container truck (power unit hauling a chassis carrying a container). In this survey, these three categories were classified as Port-related trucks. The District recognizes that the truck classification method may result in some small fraction of non-Port trucks being identified and counted as Port trucks. Further discussion regarding the uncertainty associated with this approach is discussed in Section 5.3.

The primary surveys (survey locations 1 through 36) were conducted on August 18 though 29, 2008 (see Table 4 for schedule). Certain locations such as arterial roads leading to the Port were surveyed on weekdays corresponding to high traffic volumes based on discussions with community residents and Port representatives. For example, arterials leading to the Port were surveyed on Monday because cargo ships arriving on Sunday must wait at the docks until Monday to be unloaded. Two locations were later added to the survey after District staff identified data gaps between the estimated numbers of trucks that enter and exit West Oakland based on the GPS tracking data from the Port of Oakland. 7th Street/I-880 (southbound) and 5th Street/Union Street were surveyed each for a day by STI on December 8 and 10, 2008. Both locations are high traffic intersections near I-880 freeway on-ramps.

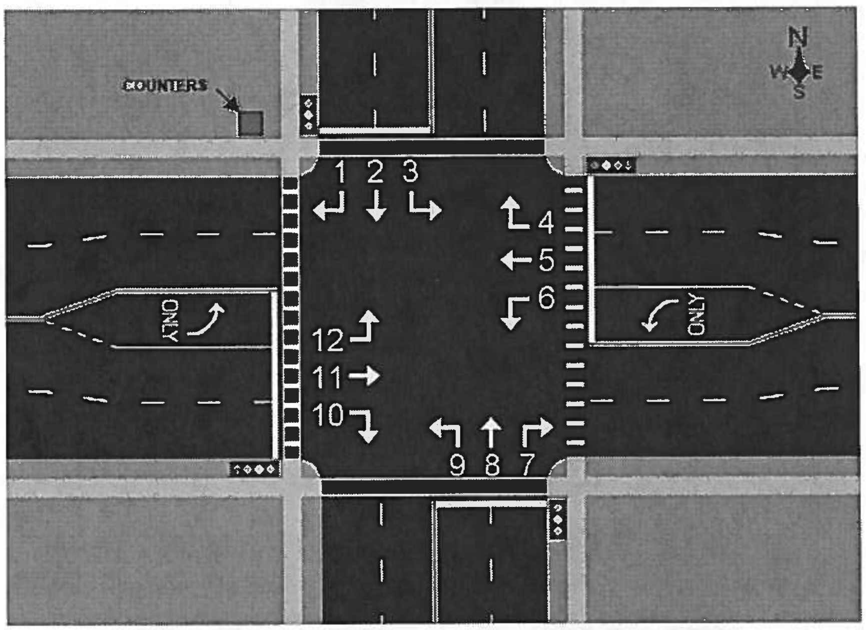
Table 4. Schedule of Manual Truck Counts for the Primary Surveys

Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
Aug 18 - Mandela & West Grand - San Pablo & West Grand - Hollis & Peralta - Hollis & 34th - Poplar & 30th	**Aug 19** - Mandela & West Grand - San Pablo & West Grand - Mandela & 34th - Peralta & 35th - Adeline & 35th	**Aug 20** - Maritime & West Grand - 7th & Frontage - 3rd & Adeline - 3rd & Market	**Aug 21** - 18th & Peralta - 7th & Wood - Chestnut & 28th - Wood & 14th - 14th & Poplar	**Aug 22** - MLK & 34th - 30th & MLK - 27th & Northgate - Market & 18th - Market & 35th	**Aug 23** - Maritime & West Grand - 7th & Frontage - 3rd & Adeline - 3rd/ Market
Aug 25 - Maritime & West Grand - 7th & Frontage - 3rd & Adeline - 3rd/ Market	**Aug 26** - 7th & Adeline - 6th & Market - 7th & Wood - 10th & Union - 9th & Pine	**Aug 27** - 5th & Market - 5th & Adeline - Frontage & West Grand - 7th & Mandela	**Aug 28** - 7th & Adeline - 5th & Market - 7th & Mandela	**Aug 29** - 12th & Brush - 7th & Brush - 6th & Brush - 5th & Broadway - 7th & Harrison - Fallon & Embarcadero	

Surveys were conducted in two shifts representing morning hours from around 7:30 am to 1:00 pm and afternoon hours from 1:00 pm to 6:00 pm. Surveyors arrived at the WOIP office approximately 30 to 45 minutes before their shifts began. At the office, the counters were grouped into teams of two and assigned a survey location for the day. Teams were provided with necessary supplies to complete the survey including survey sheets, clipboards, safety vests, portable chairs, ear plugs, face mask (if necessary), and pen or pencil. The District provided WOEIP with identification cards for use during the survey and handouts containing information on the survey and contact information. STI and Wiltec staff supervised the survey teams.

At the beginning of the shift, teams were driven to their assigned intersection and set up on the northwest corner of the intersection. As illustrated in Figure 5, vehicles have 12 possible turning movements upon entering an intersection, with the southbound right turn always designated as movement 1. From the four corners of the intersections, a vehicle may go straight, turn right, or turn left. One person per team was assigned to record truck movements one through six, corresponding to southbound or westbound traffic. The other team member recorded traffic movement seven through 12 that represent northbound or eastbound traffic. Counters documented the number of axles per truck and if the trucks were associated with Port activities. For Port trucks, the counter recorded whether the truck was a bobtail, chassis, or container trucks. Survey sheets (see Appendix A) were changed every hour. Section 2.1.2.2 presents a description of the different types of trucks and a guide to identifying Port-related trucks (as provided by CARB) that was used in this survey. The majority of the half day surveys were completed in the morning shift. STI and Wiltec staff relieved the counters on a rotational basis once during each shift. At the end of the shift, the new team was dropped off and set up at the intersection while the previous team returned to the WOEIP office to process the survey sheets.

Figure 5. Vehicle Turning Movement Designations



2.1.2.2 Truck Classification

All counters were required to attend a training course taught by STI and Wiltec on August 12, 2008, at the West Oakland Library that provided information on filling in the survey sheets, proper code of conduct, and identification of truck and axles. Counters were taught to record each truck on the survey sheet based on the number of axles. Truck axles are the supporting shafts that hold the revolving tires. From a profile view of a truck, the number of axles corresponds to the number of visible tires. A single axle was counted in cases where more than two tires are positioned on a single axle. Counters recorded axles based on the classification in Table 5. Counters practiced counting trucks on the intersection of 5th and Adeline Street as part of the training course.

Counters were trained to identify Port trucks from non-drayage trucks. Port trucks can be categorized into three types depending on tractor and trailer articulation with and without a container. The three types of Port trucks counted in this study are bobtail, chassis, and container trucks. Bobtails are three axle tractors that do not have the trailer attached (see Figure 6). For this survey, three axle trucks were recorded as either a bobtail associated with Port activity or other type, such as cement mixer or box truck.

Table 5. Truck Classification by Number of Axles

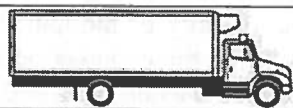
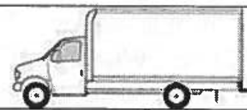
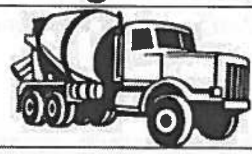
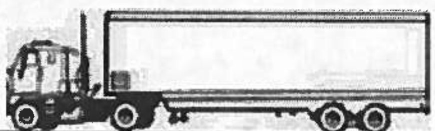
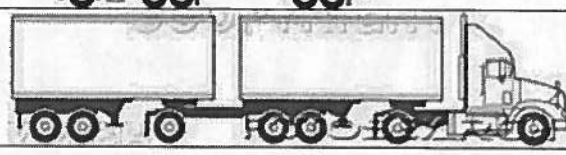
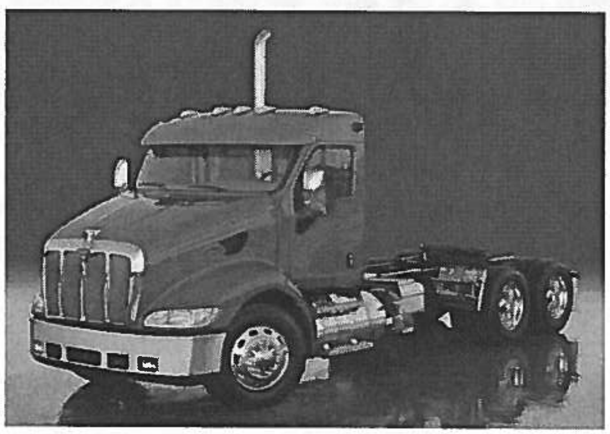
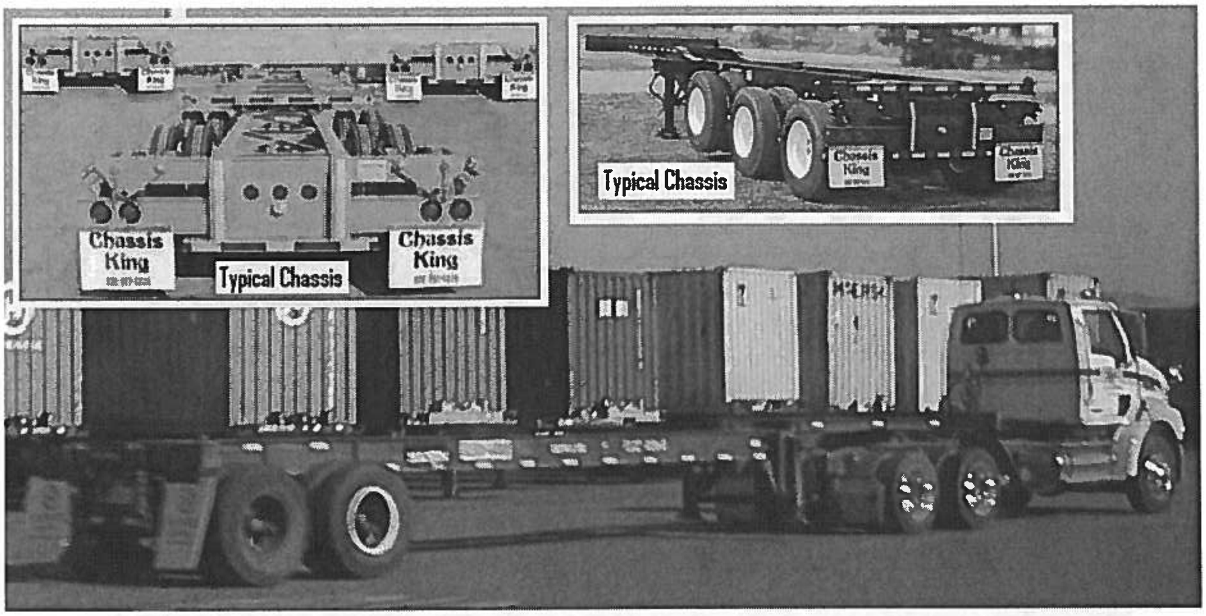
Number of Axles	Example	Representative Truck
2 axles	 	Box Truck, Courier Van
3 axles	 	Bobtail truck, Cement Mixer, Package Delivery Van, Flat Bed, Moving Van
4 axles		Car-carrier, Tractor/trailer
5 axles		Port freight truck, gasoline tanker truck
6 or more axles		Tandem tractor/trailer

Figure 6. Bobtail trucks



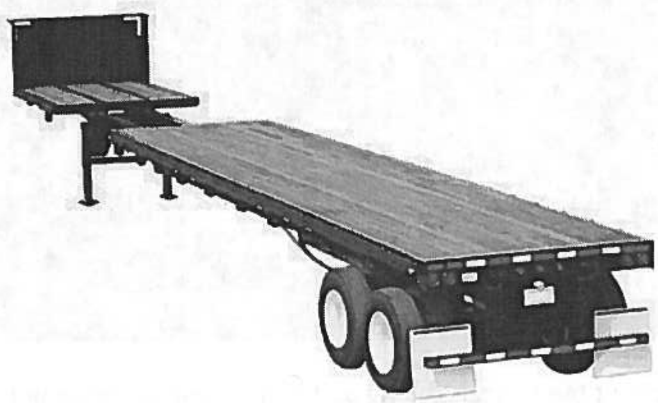
Chassis trucks are tractors with an attached I-Beam chassis trailer. The I-Beam trailers as shown in Figure 7 are used to secure either 20 foot or 40 foot ribbed containers that are loaded or unloaded to/from cargo ships.

Figure 7. Chassis Truck



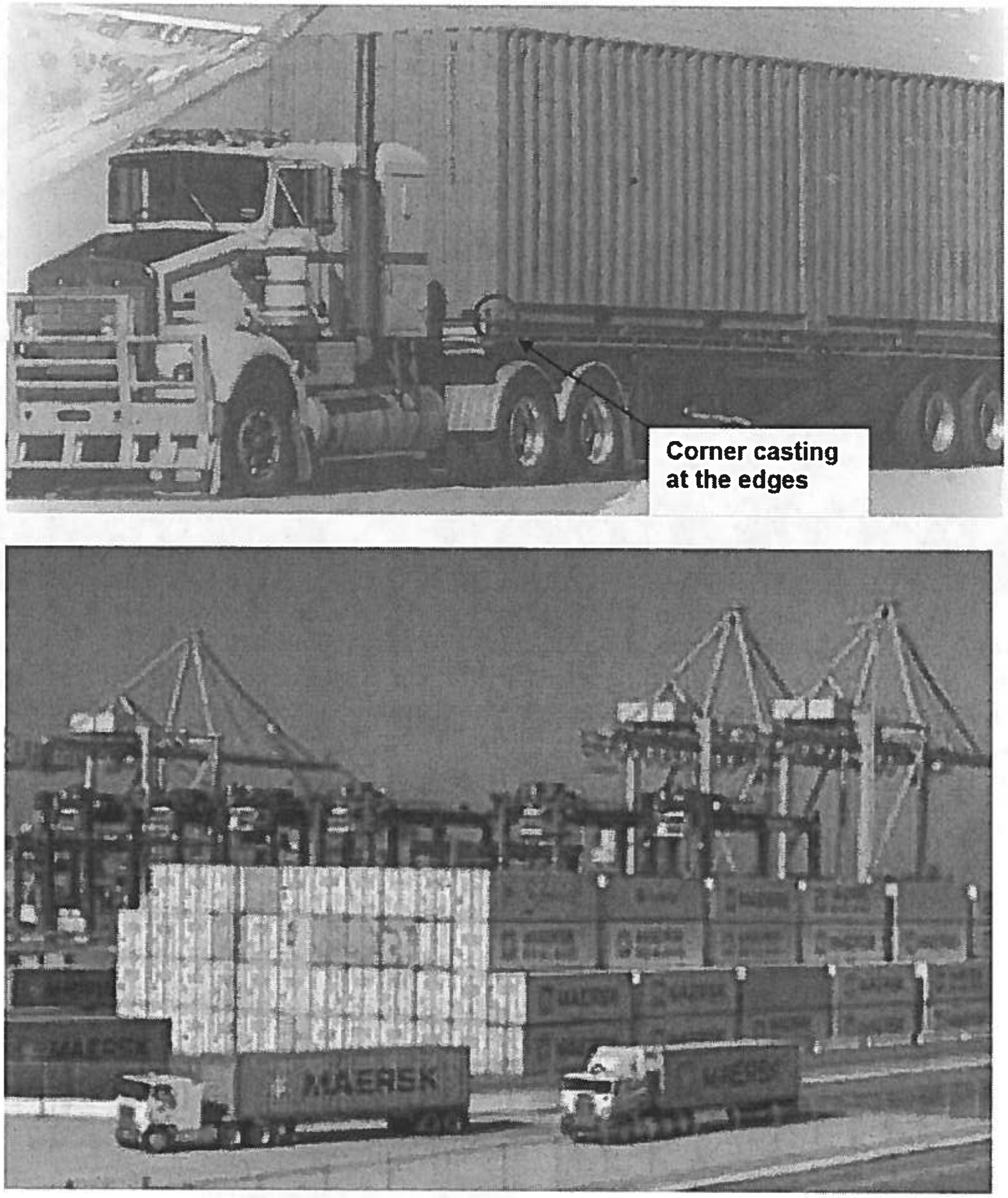
The I-Beam chassis is different from a typical flatbed chassis shown in Figure 8. A flatbed chassis is not a container chassis used to transport Port cargo and thus a tractor with a flatbed chassis was recorded based on the number of axles of the truck, but was not counted as a Port-related vehicle.

Figure 8. Flatbed Chassis



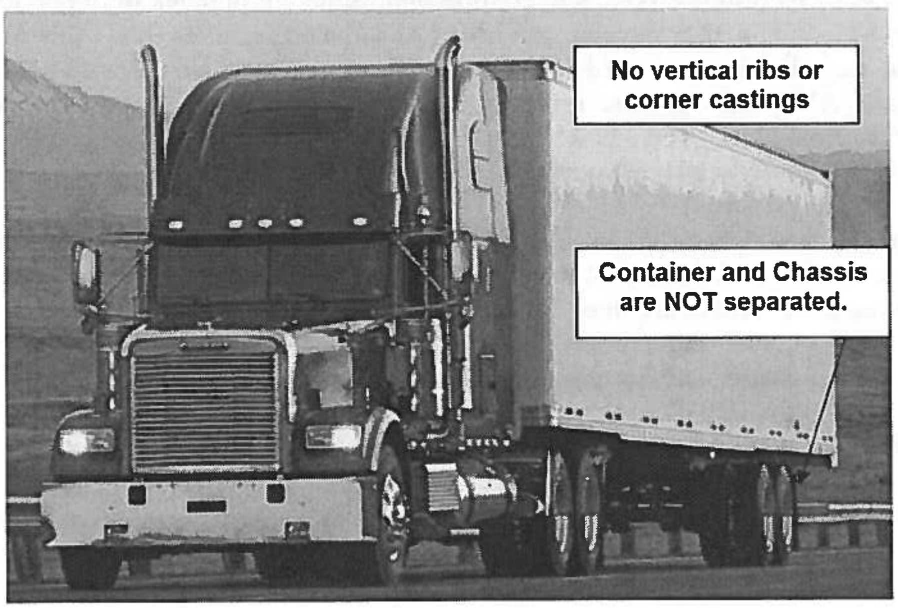
The most common type of Port related trucks are container trucks shown in Figure 9. The container trucks typically have five axles with a container loaded on an I-Beam bed chassis trailer. The containers are either 20 feet or 40 feet long with the characteristic vertical ribbing and corner castings (punched holes) on the bottom edge of the container as shown in Figure 9. For trucks with containers, only those trucks with the vertical ribbing and corner castings on the containers were counted as Port trucks.

Figure 9. Examples of Container Trucks with Vertical Ribbing



Container trucks without the typical ribbing and corner castings were not counted as Port related vehicles, but were counted as non-drayage trucks based on the number of axles. Container trailers for non-Port activities are typically 53 feet long with the container built on the chassis as a single unit (see Figure 10). The Port trucks are easily differentiated from the non-drayage trucks based on their size and characteristic vertical ribbing and corner castings on the container.

Figure 10: Examples of Non-Port Container Trucks without Vertical Ribbing



2.2 TASK 2: CONFIRM TRUCK IDLING ACTIVITY

The focus of the idling study was to verify and update the findings from previous studies since the adoption of CARB's idling regulation. CARB regulations prohibit heavy-duty trucks from idling for more than five minutes within California's borders except under certain conditions such as traffic congestion or queuing at Port terminals. The District has sponsored numerous outreach efforts to inform truck drivers of the new regulation. In addition, WOEIP conducted extensive outreach campaigns in West Oakland to educate truck drivers and residents on the requirements of the regulation. To gather more information on idling activities, the WOEIP report (TIAX, 2003) had community members conduct an idling study at six terminal gate entrances and one weigh station at the Port of Oakland. The study found that most trucks idle while waiting to be processed through the terminal gate. It takes approximately five minutes for a Port truck to be processed before entering the terminal and given the long queue that develops, the study estimated that the combined average idling time from all trucks is approximately 280 hours per day.

The District and contractor, STI, completed a study (Reid, 2007) that documents emission estimation techniques of diesel particulates generated from trucks and construction equipment. As part of that study, District staff, STI, and community members identified 52 truck-based businesses in West Oakland and surveyed these businesses regarding truck idling activities. Reported idling times ranged from 1 to 30 minutes; most facilities reported idling times of 10 minutes or less. However, 28 businesses did not respond to the survey within the project's deadline, so idling times for those facilities were based on limited curb-side observations or assumed to be 10 minutes.[1]

Because of the extensive studies that have already been completed by the Pacific Institute and the District, the focus of this task was to confirm and refine the findings from previous studies. The District, STI, and WOEIP developed a list of 11 targeted facilities (see Table 6). Three of the locations were being resurveyed to either verify or update their reported idling activity. Team One and AV Trucking were included in this survey since they did not complete the previous survey from 2007. Three lunch locations frequented by truck drivers and three Oakland businesses not previously surveyed were also included.

The task required that eight of the businesses fill out surveys that were then confirmed through curbside observations in the field. A sample of the survey sheets is provided in Appendix A. Idling activities at the remaining three lunch stops were estimated based on field observations alone. In August 2008, the District sent letters to the eight businesses requesting their participation in the study. District inspection staff hand delivered surveys to those businesses that did not reply to the initial request after one month. District staff interviewed the remaining businesses that had not completed the survey by December 1, 2008. STI conducted curbside observations in August 2008 at all of the survey locations except at Mayway Corporation, which is fully enclosed by a solid wall and reported to not own or operate a diesel fleet, but uses commercial delivery services instead.

[1] An average idling time of 10 minutes was calculated from survey results and used for facilities that did not report idling information.

Table 6. Truck Idling Survey

Company Name	Street Address	Survey/Observations	Notes
Team One	2515 Magnolia Street	Survey/Observation	Not previously surveyed
Oakland Maritime Support Services (OMSS)	11 Burma Road	Survey/Observation	Verify previous survey
US Postal Service	1675 7th Street	Survey/Observation	Verify previous survey
Pacific Galvanizing, Inc.	715 46th Avenue	Survey/Observation	Not previously surveyed
Horizon Beverage Company	1700 20th Street	Survey/Observation	Not previously surveyed
Tighe Drayage Company (Eighteen Trucking)	2230 Willow Street	Survey/Observation	Verify previous survey
A V Trucking Company	1155 3rd Street # 300	Survey/Observation	Not previously surveyed
Mayway Corporation	1338 Mandela Parkway	Survey only	Not previously surveyed
Lunch location	3rd Street between Myrtle and Market	Observation only	Recommended by community
Lunch location	Maritime Street and 14th	Observation only	Recommended by community
Coffee stand and mini mart	11 Burma Road	Observation only	Recommended by community

2.3 TASK 3: COLLECT TRUCK LICENSE DATA

Emissions rates from trucks depend on the age distribution of the trucks as well as environmental conditions, such as temperature and operating conditions, especially average speed. Age distribution plays a significant role because of recent regulations that significantly reduce criteria pollutant emissions from newer trucks. A common practice is to use older on-road trucks that are near the end of their useful life to serve the Port because of the lower annual mileage, proximity to repair facilities, and the low profit margin in Port business. In ENVIRON's Revised Seaport Air Emission Inventory (2008), the fleet distribution serving the Port of Oakland was primarily between model years 1993 and 1999 (50th percentile truck age is 1997) with almost no trucks newer than 2000 being used. As part of this survey, truck license data were collected to determine current truck age distribution at the Port to get some indication of the vehicle VMT since newer trucks are driven more miles than older trucks.

During the manual truck counts, counters recorded the license plates of at least 10 trucks that entered the survey intersection per hour. The purpose of gathering the license plate data was to develop an age distribution of diesel trucks in West Oakland. Previous studies have shown significant differences in truck age distributions developed from license plate data collected at the Port of Oakland and at the Port of Los Angeles (ENVIRON, 2008).

While developing the protocol for collecting the license plate data, STI tried using a digital camera, voice recorder, and field sheets to collect the data. However after testing the equipment in the field, STI found that the best approach was to record the license plates manually on a separate log sheet to avoid confrontations with truck drivers who sometimes objected to having their vehicles photographed.

The license numbers were then manually entered into a Microsoft Access database. The final list was provided to CARB staff which accessed the California's Department of Motor Vehicles database for 2007. CARB provided information on the model year, fuel type, manufacturer's maximum gross vehicle weight ratings (GVWR), the number of axles, the city of registration, and zip code of registration. The GVWR is the maximum allowable total weight of the truck when loaded that includes the fuel, passengers, cargo, and trailer. Typically, drayage trucks are in the GVWR class of greater than 33,000 pounds, called heavy heavy-duty trucks.

The license database available to CARB represented a single "snap-shot" of the DMV database in time. A problem encountered in using these data was that many license records were missing, that is there was no match found in the database. Subsequently, the District has acquired "real-time" access to DMV records, which have been used to match a higher percentage of the licenses recorded during the survey. The age distribution and city of registration developed for this survey relied on the records derived by the District and are reflective of DMV's 2009 database. However, the weight information was provided by CARB.

3. DATA ANALYSIS AND COMPILATION OF RESULTS

This section presents the data analysis used to estimate diesel truck activity including the number of diesel vehicles, age distributions, and idling activities. Figure 11 presents a flow diagram of the data that was collected from each task and how that data was used. The results of the survey were compiled by STI and provided to the District for additional processing and analysis. A summary of the results are presented in Section 4.0 as well as comparisons of the results to estimated on-road diesel truck activity from the HRA.

Figure 11. Flow Diagram of Data Acquisition from Truck Survey

	WHAT WAS COLLECTED?	HOW WAS THE DATA COLLECTED?	HOW WAS THE DATA USED?
Task 1	• Number of Port versus non-Port trucks (classified by truck axles) at specific intersections on surface streets • Speeds and volumes of vehicles at four intersections • Estimated Port versus non-Port trucks along I-980, I-880, I-580	• Manual counters at select intersections along surface streets • Automatic counters co-located at 4 manual intersections • Combination of video footage, manual counts, and PeMS database	• Revise risk of Port and non-Port contribution to VMT on surface street • Verify speeds of vehicles used in the HRA, Generate hourly and day-of-week profiles • Revise risk of Port and non-Port contribution on I-980, I-880, and I-580
Task 2	• Estimated time trucks spend idling at local businesses and lunch carts	• Mail out surveyed to select businesses, confirmed responses through curbside observations	• Verify previous survey results and evaluate effectiveness of outreach efforts
Task 3	• Licenses of trucks traveling on surface streets	• During the survey, manual counters captured at least 10 licenses per hour of trucks traveling on surface streets	• Match the licenses to 2009 DMV records to develop truck age distribution for comparison to 2009 Port survey

3.1 WEST OAKLAND TRAFFIC COUNTS AND VEHICLE SPEED

3.1.1 Surface Street Counts

Manual counts were performed at 38 intersections in West Oakland. Twenty-eight of the surveys were single or half a day counts while the remaining ten intersections were surveyed over multiple days (two or three days). The truck counts presented in this section are reflective of weekday activities between the hours of 7:30 am to 6:00 pm and Saturday activity during this same period at the Port entrances. However, it should be noted that truck traffic varied day to day as indicated from the multiple day counts.

Table 7 presents the total daily weekday manual counts (combined from all 12 possible turning movements) for all intersections that were surveyed. Counts from half-day surveys (noted with *) were doubled to reflect full day counts. The highest total truck traffic (greater than 1,000 trucks) is located near on-ramps to freeways and arterials leading to the Port of Oakland. Of the arterials leading to the Port (locations 1 through 4), Port trucks represent from 51% to 84% of the traffic volume. Port trucks represented about 46% to 80% of the trucks traveling on freeway on-ramps (locations 9, 10, 12, 13, 37, and 38). Sites with moderate to low (greater than 100 trucks but less than 1,000) truck counts are perimeter entrances (locations 16 through 31) into West Oakland and tend to be dominated by non-Port trucks, accounting for 64% to 100% of the total truck counts at these sites. Sites with very low truck counts (< 100) were sites near schools. Of the sites counted that are near schools (locations 33, 34, and 36), non-Port trucks represent 91% to 100% of the total trucks. Poplar and 30th has the most truck traffic in close proximity to a school, with 201 trucks (combined Port and non-Port trucks) counted during a half day survey (or 402 trucks for a daily total).

Table 7. Total Weekday Daily Manual Truck Counts for Surface Streets

Location	Intersection	Date of Survey	Total Number of Port Truck	% of Port Trucks	Total Number of Non-Port Trucks	% of Non-Port Trucks	Total Trucks
1	Maritime & West Grand	8/20/2008	1120	57%	843	43%	1963
		8/25/2008	999	61%	644	39%	1643
2	7th & Frontage	8/20/2008	2404	68%	1124	32%	3528
		8/25/2008	3002	61%	1902	39%	4904
3	3rd & Adeline	8/20/2008	2897	81%	670	19%	3567
		8/25/2008	3720	84%	693	16%	4413
4	3rd & Market	8/20/2008	656	51%	623	49%	1279
		8/25/2008	969	57%	735	43%	1704
5	Mandela & West Grand	8/18/2008	372	24%	1191	76%	1563
		8/19/2008	399	21%	1546	79%	1945
6	San Pablo & West Grand	8/18/2008	67	16%	360	84%	427
		8/19/2008	49	7%	653	93%	702
7	7th & Mandela	8/27/2008	235	33%	487	67%	722
		8/28/2008	223	33%	450	67%	673

Location	Intersection	Date of Survey	Total Number of Port Truck	% of Port Trucks	Total Number of Non-Port Trucks	% of Non-Port Trucks	Total Trucks
8	7th & Adeline	8/26/2008	150	23%	492	77%	642
		8/28/2008	120	20%	491	80%	611
9	5th & Market	8/27/2008	488	46%	584	54%	1072
		8/28/2008	509	52%	477	48%	986
10	Frontage & West Grand	8/27/2008	1954	53%	1743	47%	3697
11	Hollis & Peralta	8/18/2008	17	6%	246	94%	263
12	6th & Market	8/26/2008	923	69%	414	31%	1337
13	5th & Adeline	8/27/2008	2962	80%	736	20%	3698
14	18th & Peralta	8/21/2008	36	21%	138	79%	174
15	7th & Wood	8/21/2008	271	31%	593	69%	864
		8/26/2008	317	32%	662	68%	979
16*	Mandela & 34th	8/19/2008	20	6%	328	94%	348
17*	Hollis & 34th	8/18/2008	16	9%	170	91%	186
18*	Peralta & 35th	8/19/2008	16	5%	304	95%	320
19*	Adeline & 35th	8/19/2008	10	6%	152	94%	162
20*	Market & 35th	8/22/2008	6	2%	302	98%	308
21*	MLK & 34th	8/22/2008	0	0%	216	100%	216
22*	30th & MLK	8/22/2008	0	0%	148	100%	148
23*	27th & Northgate	8/22/2008	38	8%	450	92%	488
24*	Market & 18th	8/22/2008	18	5%	330	95%	348
25*	14th & Poplar	8/21/2008	30	20%	120	80%	150
26*	12th & Brush	8/29/2008	40	14%	256	86%	296
27*	7th & Brush	8/29/2008	74	14%	458	86%	532
28*	6th & Brush	8/29/2008	34	31%	74	69%	108
29*	5th & Broadway	8/29/2008	270	22%	978	78%	1248
30*	7th & Harrison	8/29/2008	334	36%	596	64%	930
31*	Embarcadero & Fallon	8/29/2008	214	28%	556	72%	770
32*	Wood & 14th	8/21/2008	16	5%	308	95%	324
33*	10th & Union	8/26/2008	4	4%	90	96%	94
34*	Poplar & 30th	8/18/2008	36	9%	366	91%	402
35*	4th & Pine	8/26/2008	2	25%	6	75%	8
36*	Chestnut & 28th	8/21/2008	0	0%	46	100%	46
37	5th & Union	12/9/2008	1420	56%	1138	44%	2558
38	7th & I-880	12/8/2008	1088	74%	384	26%	1472

Notes: * Half day surveys were doubled to represent full day counts.
Port trucks included bobtails, Port chassis, and Port container trucks

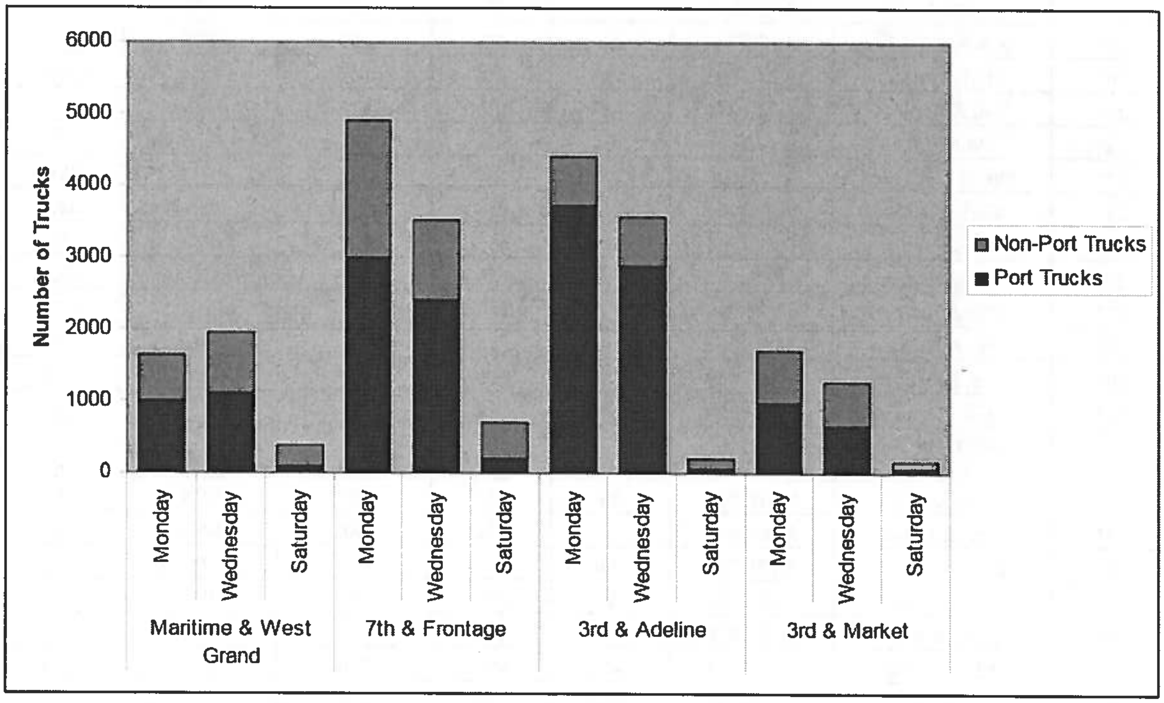
Weekend counts were only performed on Saturday, August 23, 2008 at four arterial roads leading to the Port (locations 1 through 4). Table 8 presents the total daily number of trucks that were counted on Saturday. The counts at these sites were dominated by non-Port trucks that represented 61% to 74% of the total trucks counted at these sites. For Port arterial roads where counts were performed Monday, Wednesday, and Saturday, truck volumes tended to be heaviest on Monday (see Figure 12). Truck volumes along Port arterial roads decreased by 80-95% on

Saturdays, relative to weekday averages. Although Port terminals and gates are closed on Saturday, the survey showed limited goods movement along these roadways, which may be associated with intermodal domestic rail transport.

Table 8. Saturday Manual Truck Counts on Port Arterial Roads

Location	Intersection	Date of Survey	Total Number of Port Truck	% of Port Trucks	Total Number of Non-Port Trucks	% of Non-Port Trucks	Total Trucks
1	Maritime & West Grand	8/23/2008	96	26%	280	74%	376
2	7th & Frontage	8/23/2008	197	28%	499	72%	696
3	3rd & Adeline	8/23/2008	68	33%	140	67%	208
4	3rd & Market	8/23/2008	61	39%	95	61%	156

Figure 12. Port and Non-Port Truck Counts by Day of Week at Port Arterial Roads.



3.1.2 Freeway Counts

Manual freeway counts of I-580, I-880, and I-980 were conducted by STI. Video footage was collected of only I-880 in half hour intervals that were alternated with half hour intervals of manual counting from the West Oakland BART platform. The video footage, however, was not processed due to low visibility that made distinguishing the number of truck axles difficult. Half-day manual counts were collected from I-880 on Monday, Wednesday, and Saturday and one full day count was collected on Sunday. Manual surveys were performed on a Tuesday for half a day on I-580 and corresponding full day on I-980.

Table 9 presents the hourly weekday and weekend manual counts for all freeways surveyed. Counts collected for less than one hour were linearly extrapolated to reflect hourly counts. For weekday traffic, Port trucks represent approximately 28% to 45% of the trucks traveling on I-880. Non-Port trucks dominated the weekend traffic by representing 76% to 100% of the trucks traveling on I-880. For both I-580 and I-980, Port trucks represent a small fraction (ranging from 0 to 7%) of the overall trucks traveling on these freeways.

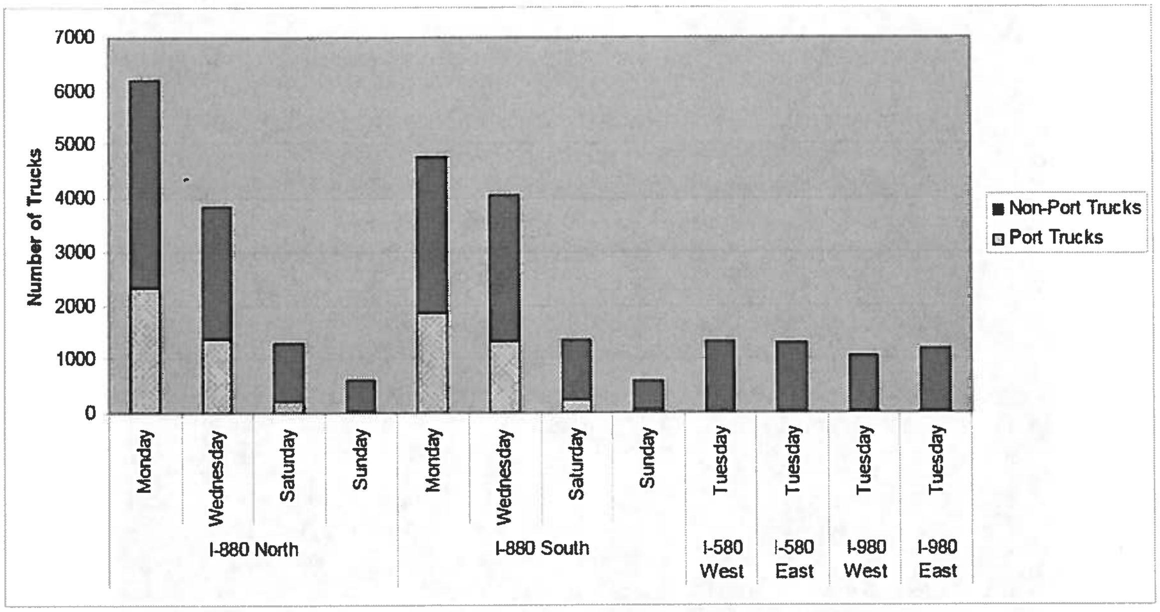
Figure 13 presents the daily traffic counts (7:00 am to 6:00 pm) that were extrapolated from the hourly manual counts. The highest total weekday count of over 6,000 Port and non-Port trucks were recorded on Monday along northbound I-880. Truck volumes on I-880 progressively declined as the week advanced with the lowest overall recorded truck counts occurring on Sunday. Truck volumes on all surveyed freeways were evenly distributed in both directions except for Monday where northbound traffic on I-880 was approximately 20% higher as compared to southbound traffic volumes. Similar to the findings from the surface street survey, a small fraction (ranging from 4% to 18%) of Port trucks were counted on the weekend on I-880 even though the Port terminals and gates are closed. Some of the weekend activity may be associated with intermodal domestic rail transport.

Table 9. Total Hourly Manual Counts for Freeways

Freeway	Traffic Direction	Date of Survey	Start Time	Hourly Number of Port Trucks	% of Port Trucks	Hourly Number of Non-Port Trucks	% of Non-Port Trucks	Total Trucks per Hour
I-880	Northbound	12/8/2008 (Monday)	8:00 AM	142	29%	340	71%	482
			9:00 AM	244	38%	390	62%	634
			10:00 AM	247	43%	332	57%	579
		12/10/2008 (Wednesday)	1:00 PM	208	41%	300	59%	508
			2:00 PM	89	28%	230	72%	319
			3:00 PM	124	40%	188	60%	312
			4:00 PM	80	31%	180	69%	260
		12/13/2008 (Saturday)	8:00 AM	32	18%	146	82%	178
			9:00 AM	22	18%	102	82%	124
			10:00 AM	13	14%	83	86%	96
			11:00 AM	11	15%	61	85%	72
		12/14/2008 (Sunday)	8:00 AM	2	3%	60	97%	62
			9:00 AM	0	0%	64	100%	64
			10:00 AM	0	0%	48	100%	48
			1:00 PM	8	15%	46	85%	54
			2:00 PM	2	3%	72	97%	74
			3:00 PM	2	6%	30	94%	32
	Southbound	12/8/2008 (Monday)	8:00 AM	124	35%	230	65%	354
			9:00 AM	220	45%	274	55%	494
			10:00 AM	164	36%	292	64%	456

Freeway	Traffic Direction	Date of Survey	Start Time	Hourly Number of Port Trucks	% of Port Trucks	Hourly Number of Non-Port Trucks	% of Non-Port Trucks	Total Trucks per Hour
		12/10/2008 (Wednesday)	1:00 PM	148	32%	308	68%	456
			2:00 PM	128	28%	322	72%	450
			3:00 PM	116	34%	226	66%	342
			4:00 PM	88	39%	138	61%	226
		12/13/2008 (Saturday)	8:00 AM	40	23%	136	77%	176
			9:00 AM	28	24%	88	76%	116
			10:00 AM	13	12%	93	88%	106
			11:00 AM	9	10%	81	90%	90
		12/14/2008 (Sunday)	8:00 AM	6	12%	46	88%	52
			9:00 AM	12	17%	58	83%	70
			10:00 AM	6	10%	52	90%	58
			1:00 PM	2	6%	34	94%	36
			2:00 PM	6	10%	54	90%	60
			3:00 PM	3	8%	37	93%	40
I-580	Westbound	5/5/2009 (Tuesday)	8:00 AM	0	0%	81	100%	81
			9:00 AM	1	1%	125	99%	126
			10:00 AM	0	0%	140	100%	140
			11:00 AM	1	1%	133	99%	134
	Eastbound	5/5/2009 (Tuesday)	8:00 AM	0	0%	93	100%	93
			9:00 AM	0	0%	115	100%	115
			10:00 AM	2	2%	107	98%	109
			11:00 AM	2	1%	158	99%	160
I-980	Westbound	5/5/2009 (Tuesday)	9:00 AM	3	3%	93	97%	96
			10:00 AM	2	2%	110	98%	112
			11:00 AM	4	4%	96	96%	100
			1:00 PM	3	3%	109	97%	112
			2:00 PM	4	4%	110	96%	114
			3:00 PM	4	5%	77	95%	81
			4:00 PM	2	4%	54	96%	56
	Eastbound	5/5/2009 (Tuesday)	9:00 AM	2	2%	104	98%	106
			10:00 AM	0	0%	96	100%	96
			11:00 AM	1	1%	102	99%	103
			1:00 PM	1	1%	141	99%	142
			2:00 PM	0	0%	115	100%	115
			3:00 PM	1	1%	118	99%	119
			4:00 PM	6	7%	76	93%	82

Figure 13. Port and Non-Port Truck Counts by Day of Week on Surveyed Freeways.

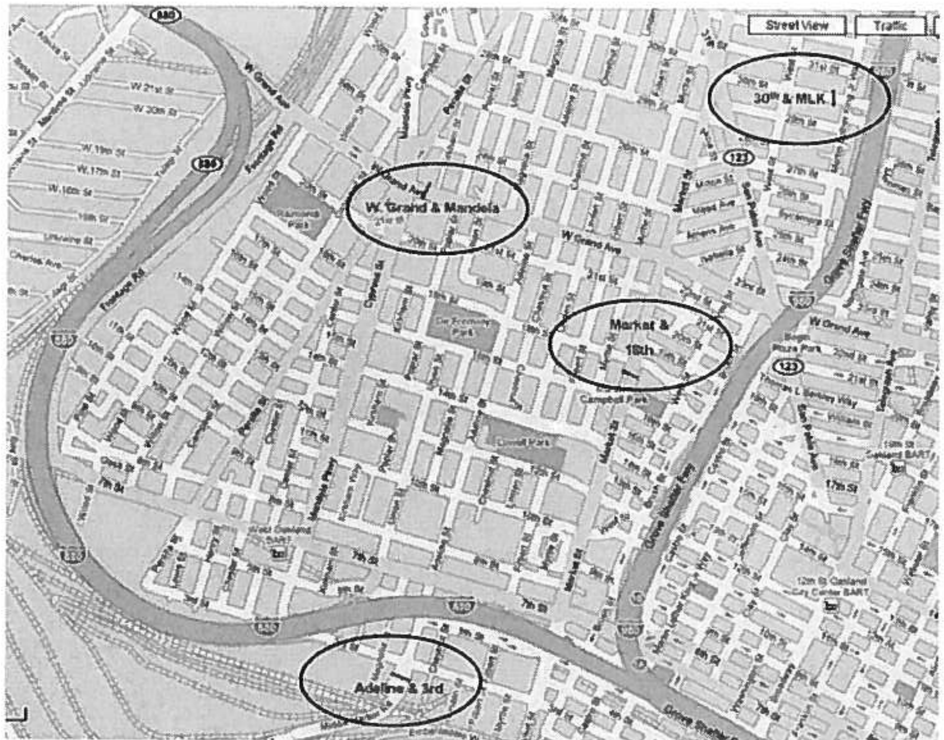


3.1.3 Automatic Counts

Wiltec co-located automatic counters with manual counters at four intersections in West Oakland. The data gathered from the automatic counters included vehicle speeds, total number of vehicles, and vehicle classification by the number of axles. The data collected from the automatic counters were then used to create temporal profiles of truck traffic in West Oakland. It should be noted that there were discrepancies between the automatic counters and the manual counters on the total number of trucks as well as categorizing trucks based on the number of axles (see Appendix B). Because of the uncertainty associated with the automatic counters, the District relied on the manual counts to estimate traffic volumes (and VMT) for West Oakland and used the automatic counters to characterize speeds and diurnal travel patterns for comparison to the HRA assumptions. The automatic counter data were not used to modify the HRA results.

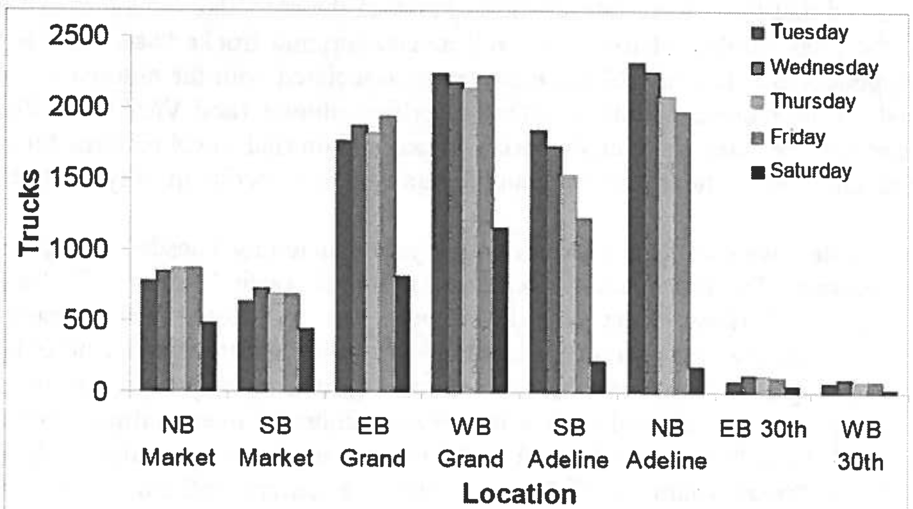
Automatic count data were collected for a five-day period spanning Tuesday through Saturday at all four intersections. The four locations represent two high traffic locations (3rd Street/Adeline Street and Mandela Parkway/West Grand Avenue), one moderate traffic location (Market Street/18th Street), and one low activity residential street (30th Street/ Martin Luther King Drive) (see Figure 14). Figure 15 presents the distribution of truck activity based on the day of the week. Consistent with the manual counts that were conducted over multiple days, there is a steep decline of 34% to 90% in truck traffic on Saturday as compared to the weekdays. Truck counts at Adeline Street, south of 3rd Street, which are heavily influenced by Port activity, showed a gradual declining number of trucks over the course of the week. By Saturday, the traffic at Adeline had declined by 82% to 90% of the weekday traffic counts, which is consistent with the findings from the manual counts. All of the other sites showed consistent traffic activity throughout the weekdays.

Figure 14. Placement of Automatic Counters



Note: Red lines show the approximate locations where automatic counters were installed.

Figure 15. Automatic Truck Counts by Day of Week



Note: NB = Northbound, SB = Southbound, EB = Eastbound, WB = Westbound

The truck traffic patterns over the course of the day derived from the automatic count data are shown in Figure 16. The graph indicates that the majority of the truck traffic occurs between the hours of 7:00 am to 6:00 pm, approximately the same period for which the manual truck counts were collected. Saturday traffic patterns shown in Figure 17 show a higher hourly variation. Most of the traffic pattern on Saturday consist of two axle trucks and are likely not representative of Port-related activities.

Figure 16. Weekday Percentage of Trucks on Roads per Hour (Tuesday-Friday)

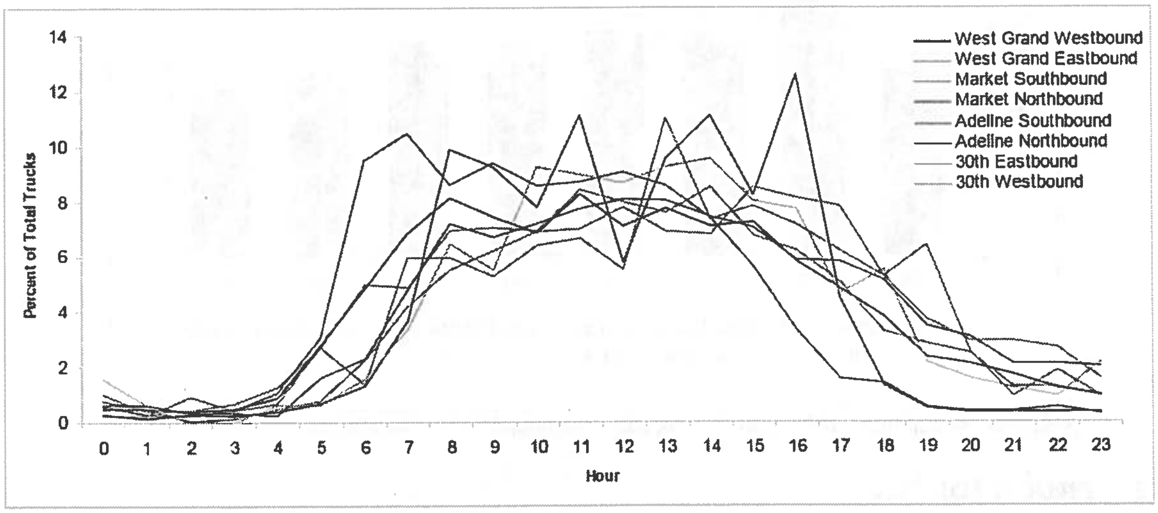
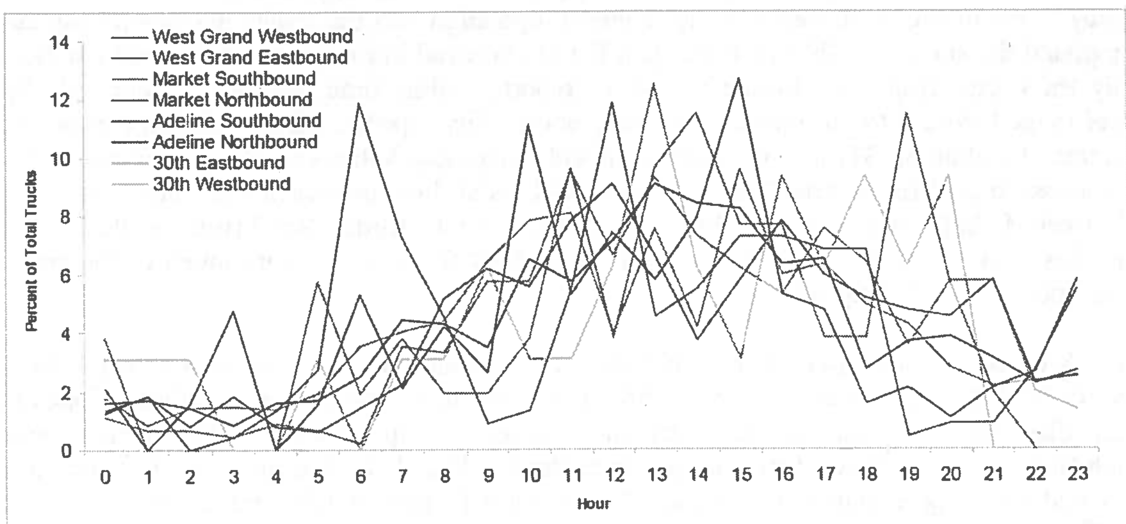
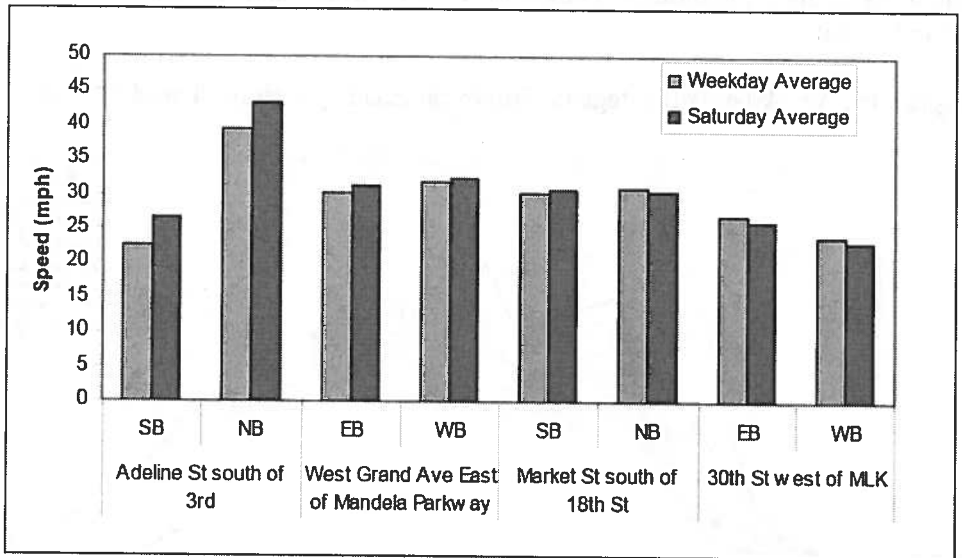


Figure 17. Weekend (Saturday) Percentage of Trucks on Roads per Hour



The automatic counters also registered vehicle speeds in miles per hour (mph) by hour of the day. Speeds varied little by time of day. The speeds were converted to 24-hour averages and also averaged across the four weekdays to produce average weekday and Saturday speeds at each of the four automatic counter locations (see Figure 18). Based on the automatic counter data, there appears to be minimal difference between weekday versus Saturday speeds.

Figure 18. Truck Speeds



Note: SB - southbound, NB – northbound, EB – eastbound, WB – westbound

3.2 TRUCK IDLING

The District conducted additional idling surveys at eight local businesses in West Oakland that were either not previously included in a survey or to confirm their responses from an earlier survey. One of these businesses is no longer in operation, but the remaining seven businesses completed the survey. Table 10 presents a list of surveyed businesses, the reported number of daily truck trips from each business, and the reported idling time per truck. Reported idling times ranged from 0 to 30 minutes, and only one facility reported idling times in excess of 10 minutes. In addition, STI also conducted curbside field observations of idling activities at these businesses to confirm reported idling times as well as at three popular mobile lunch corners on 3rd Street/Market Street, Maritime Street/14th Street, and 11 Burma Road (truck scales). Idling activities observed at the three lunch stops were about five minutes with much of the activity being sporadic and infrequent.

The US Postal Service reported 68 daily truck trips. In follow-up discussions, the Postal Service has stated that they operate a total of 68 trucks, but there are numerous other independent companies that make trips to the distribution center to ship packages. The manual counts conducted at 7th and Wood Street across from the US Postal Service main service truck gates indicated much higher numbers of trucks. Counts tallied a total of 1,843 trucks over two days at the 7th and Wood Street intersection with about 922 daily truck trips to or from the Post Office during the hours of the survey.

Table 10. Truck Idling Survey Results

Location/Company Name	Street Address	Number of Trucks Per Day	Average Idling Time Per Truck
Team One	2515 Magnolia Street	Out of business	n/a
Oakland Maritime Support Services (OMSS)	11 Burma Road	1,400	5-10 min.
US Postal Service	1675 7th Street	> 922[1]	5 min.
Pacific Galvanizing, Inc.	715 46th Avenue	1	3 min.
Horizon Beverage Company	1700 20th Street	5	3-5 min.
Tighe Drayage Company (Eighteen Trucking)	2230 Willow Street	4	0 min.
Mayway Corp.	1338 Mandela Parkway	0	n/a[2]
A V Trucking Company	1155 3rd Street # 300	5	30 min.
Lunch Location	3rd Street between Myrtle and Market	Variable	5 min.
Lunch Location	Maritime and 14th Street	Variable	5 min.
Coffee stand and mini mart	11 Burma Road	Variable	5 min.

Note: The idling times are self-reported by the businesses, but were verified through curbside observations. [1]Based on average manual counts collected on August 21 and 26, 2008 from 7:37 am to 6:00 pm. Self-reported survey results from the Post Office incorrectly responded with the number of trucks owned (68 trucks), instead of daily truck trips. [2] Shipments are sent daily through a commercial carrier.

3.3 TRUCK AGE DISTRIBUTION

As part of Task 1 (manual truck counts), counters recorded at least 10 license plates of trucks per hour during their shift to develop an age distribution of diesel trucks in West Oakland. Additional license plate data was also gathered by STI and WOEIP as they supervised the manual count teams.

A total of 7,324 truck license plates were captured in West Oakland over the course of the truck survey. These license plates were cross-referenced with 2009 California Department of Motor Vehicles (DMV) registration database which provided information on:

- Truck's model year
- Fuel type
- City of registration
- Zip code of registration, and
- Weight (gross vehicle weight rating – GVWR and number of truck axles), if available.

Of the 7,324 licenses, approximately 1,735 licenses are not registered in California. It was assumed that a majority of these vehicles are registered out of state or have since been taken out of service. About 1,141 of the 5,589 California registered licenses were recorded multiple times, which suggests that some fraction of MHD and HHD trucks routinely make local deliveries. All of the 5,589 licenses including duplicates licenses were retained to fully characterize the number of trucks and distances these trucks travel in West Oakland. Inclusion of the duplicate licenses had no impact on the resulting age distribution or median truck age shown here and in Section 4.

Table 11 and Figure 19 present the age distribution for all 5,589 trucks matched in the DMV database. Of the 5,589 matched plates:

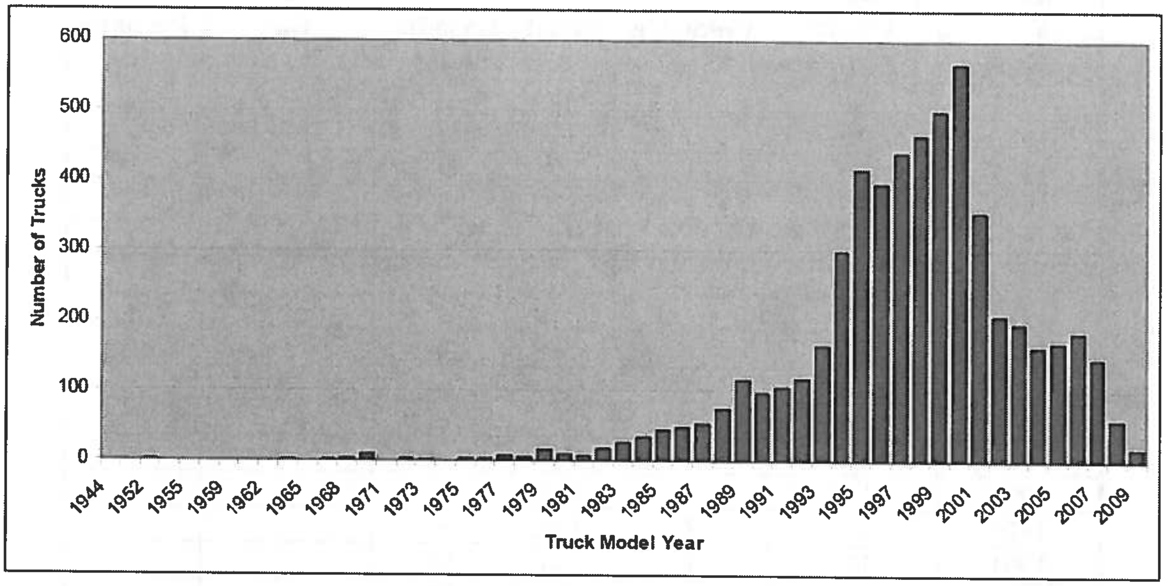
- 5,209 (93%) of the trucks are diesel-powered
- 316 (5.7%) are gasoline-fueled,
- eight (0.1%) are natural gas,
- two (0.03%) are propane, and
- 54 were unknown.

Table 11. Age Distribution and Fuel Type of Trucks Operating in West Oakland

Model Year	Number of Trucks	Fuel Type				
		Unknown	Diesel	Gasoline	Natural Gas	Propane
1944	1	1				
1951	1			1		
1952	3	1	1	1		
1954	1			1		
1955	1	1				
1957	1	1				
1959	1	1				
1960	1		1			
1962	1		1			
1964	2			2		
1965	1			1		
1966	3	2		1		
1968	4			4		
1970	11		9	2		
1971	1		1			
1972	4	1	2	1		
1973	2			2		
1974	1			1		
1975	4		2	2		
1976	4		2	2		
1977	9	1	5	3		
1978	6		1	5		
1979	17	1	12	4		

Model Year	Number of Trucks	Fuel Type				
		Unknown	Diesel	Gasoline	Natural Gas	Propane
1980	10	1	8	1		
1981	8		8			
1982	19		14	5		
1983	26	3	20	3		
1984	35	1	29	5		
1985	45		38	5		2
1986	49		42	7		
1987	53		48	4	1	
1988	76	1	67	8		
1989	116	5	99	12		
1990	97	1	90	6		
1991	107		99	8		
1992	119		113	6		
1993	165	2	154	9		
1994	301	1	288	12		
1995	417	1	399	17		
1996	395	1	382	12		
1997	440	3	422	15		
1998	465	6	443	15	1	
1999	501	3	482	16		
2000	568	3	547	17	1	
2001	355	6	339	10		
2002	208	1	193	14		
2003	196		187	9		
2004	163	1	140	18	4	
2005	169	4	150	15		
2006	183		170	13		
2007	146		128	17	1	
2008	59		55	4		
2009	18		18			
Totals	5,589	54	5,209	316	8	2

Figure 19. Truck Age Distribution Based on License Plates



4. FINDINGS AND COMPARISONS

The results of the West Oakland truck survey are summarized in this section and comparisons are presented to previous findings and assumptions in the HRA. The study objectives under Tasks 1 through 3 were to estimate traffic volumes along local streets and freeways, verify truck idling activities, and develop the age distribution of trucks. Traffic volumes were estimated using a combination of manual counters posted at specific street intersections, video tape footage of truck traffic on I-880, and automatic counters placed on local streets, and the Bay Area freeway network. Figure 20 presents a summary of the key findings that are discussed in this section.

4.1 TRAFFIC VOLUMES ON SURFACE STREETS

To ensure that the study results are typical of average conditions at the Port, the District evaluated the number of vessel calls that occurred over the course of the study. The Port of Oakland reported that the month of August typically has the highest number of vessel calls due to the upcoming holiday season. From August 18^{th} to 29^{th}, the Port reported 66 vessel calls - an average of 5.5 vessels per day. For 2008, a total of 1,928 vessels delivered cargo to the Port - approximately 5.3 vessels per day. Based on the comparison, the District concluded that the two week study is representative of typical operating conditions at the Port. Further discussions regarding the representativeness of the data to annual average operations conditions at the Port are presented in Section 5.3.

Truck volumes were estimated on surface streets of West Oakland by developing a roadway network of frequently used truck routes. A number of trucks were estimated to travel on each route. The District developed 55 unique routes that trucks generally travel to and from the Port of Oakland (see Appendix C). The truck routes were developed using the GPS tracking data collected from approximately 200 trucks that traveled through the Port of Oakland (see Section 1.3) from 2006 through 2007. The District also conducted a short study in 2007 to characterize routes of non-Port trucks. In that study, District staff followed an iterative process of randomly selecting trucks as they entered West Oakland and tracking them until they reached their final destination in West Oakland or merged onto the freeway. The District combined the routes from both studies to develop the detailed roadway network. The manual counts were then used to estimate the number of trucks that travel daily on each route. The manual counts provide the actual number of trucks at each intersection by the time of day and day of the week. The District then estimated the trucks on each route to closely match the intersection counts.

Figure 21 presents the truck volumes during weekday business hours on each route in West Oakland based on the results of the manual survey. A majority of the truck traffic is along main arterial roads leading to or from the Port of Oakland to the I-880 freeway. On surface streets, the District estimates that about 7,200 trucks travel daily (7:00 am to 6:00 pm) through West Oakland including trucks entering and exiting from the I-880 freeway. Port trucks represent much of the traffic; 3,700 Port trucks (51% of the truck traffic) travel daily through West Oakland on surface streets. This finding does not imply that Port trucks are traveling throughout the community on local streets, but that on average, about half of the trucks traveling on the main arterial roads, which make up the bulk of the truck volumes, are Port trucks. Table 12 presents a

Figure 20. Summary of Key Findings from Truck Survey

	DATA COLLECTED	KEY FINDINGS	COMPARISON / CONCLUSIONS
TRUCK VOLUMES	• Truck volumes on surface streets were estimated to match the manual counts at intersections along specific routes	• 7,200 trucks travel daily (7:00 am to 6:00 pm) through West Oakland on surface streets of which 3,700 (51%) are Port trucks	• This survey found significantly fewer trucks on surface streets compared to the HRA • The survey found significantly more Port trucks on surface streets compared to the HRA • Recommend estimating VMT for surface streets using survey results and estimating revised risk
TRUCK VOLUMES	• Freeway volumes on I-880 were based on manual counts, video footage, and PeMS, Freeway volumes on I-580 and I-980 were estimated using only manual counts	• Daily freeway volumes on I-880 (7:00 am to 6:00 pm) were 9,700 trucks with 37% being Port related • 2,100 to 2,600 trucks travel from 7:00 am to 6:00 pm on I-580 and I-980 with one to two percent being Port trucks.	• The survey recorded more trucks on I-880 than used in the HRA • Truck traffic volumes on I-980 and I-580 were two to three times lower than those of the HRA • Recommend revising health risk for freeways using survey results
TRUCK IDLING	• Idling time at local businesses and lunch carts	• Majority of businesses are complying with five minute idling regulation • Results were consistent with 2007 District survey • Effective outreach being implemented by the community and regulatory agencies	• Effective outreach being implemented by the community and regulatory agencies
TRUCK AGE DISTRIBUTION	• Licenses from trucks traveling on surface streets	• Median model year for all trucks is 1997 • 78% of trucks had model year of 1994 or later • 49% of the trucks were registered in the Bay Area (mostly in Oakland, San Leandro, San Jose, and San Francisco) • 24% of the trucks were registered out of state or are no longer running • 27% of the trucks were within California, but outside of the Bay Area (mostly from Sacramento, Modesto, Stockton, Fresno, and Tracy) • Truck age consistent with Port's findings near terminals	• Truck age consistent with Port's 2008 truck age survey near terminal gates • Continue outreach by the District's incentive/grant program

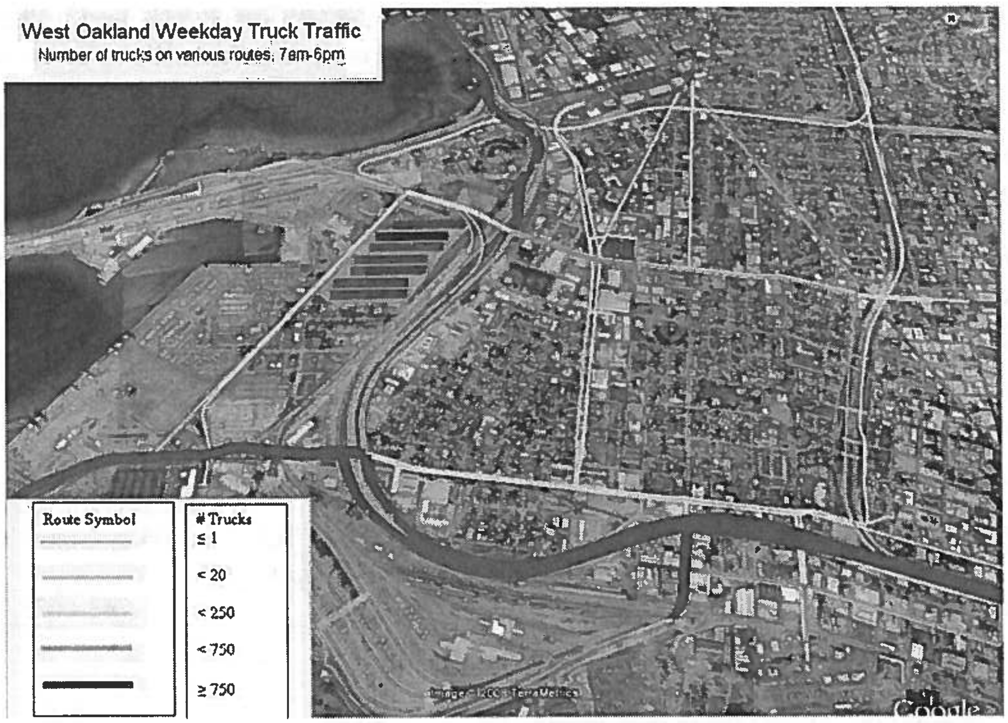
summary of estimated daily traffic volumes on surface streets in West Oakland during daytime business hours.

Table 12. Summary of Daily Truck Traffic Volume on Surface Streets

Types of Trucks	Local Streets and exiting/entering I-880
All Trucks	7,200
Port Trucks Only	3,700

Note: Truck volumes are reflective of daytime business hours from 7:00 am to 6:00 pm

Figure 21. Weekday Truck Volumes on Routes in West Oakland



The District initially attempted to extrapolate the daytime traffic volumes over 24 hours. However, nighttime activity patterns of trucks were not surveyed as part of this study. It is likely that some truck drivers prefer to travel during the evening hours to avoid traffic congestion on the freeways. Without additional survey data on nighttime activity, 24 hour traffic volumes on surface streets and freeways were not estimated.

The District compared the findings from this survey to the estimated traffic volumes used in the HRA. CARB provided the District with a database showing the entire roadway networks used in the HRA that includes speeds, link length, hour, and vehicle miles traveled. The traffic volumes and speeds were predicted using a Transportation Demand Model (TDM) that utilizes population, employment, surveys, income, roadway and transit networks, and transportation costs to forecast traffic patterns. These activities are assigned to roadway links that represent fleet population and average speeds on a specific freeway, ramp, or major or minor arterial. The estimated VMT (from 7:00 am to 6:00 pm) in the HRA on surface streets for MHD and HHD trucks is approximately 52,400. The dimensions of the West Oakland area are roughly 1.4 miles by 1.7 miles. An individual truck travels approximately one to 1.5 miles with the West Oakland area before exiting the West Oakland boundary. The largest distance traveled by a single truck can be as much as 2.5 miles if they are making local deliveries. By dividing the VMT by the largest distance of 2.5 miles, the VMT used for the HRA corresponds to at least 21,000 trucks travelling daily through West Oakland surface streets. This truck estimate can be significantly higher if one uses a more typical distance of 1.5 miles or less (e.g., typical distance traveled by Port trucks on surface street was less than one mile in the HRA). Regardless of the exact distance traveled by trucks, the estimated surface street traffic volume used in the HRA appears to be at least three times higher than the findings from this survey (7,200 trucks).

To determine if the overestimate is consistent throughout the traffic network used in the HRA, the District compared manual counts recorded at key intersections along West Grand Avenue and Market Street to truck volumes used in the HRA (counts from 7:00 am to 6:00 pm; see Table 13). The number of trucks from the HRA was calculated by dividing the VMT by the distance traveled along each main street. At each intersection, the estimated truck counts from the TDM are consistently higher (from 4 to 22 times higher) than actual counts recorded in this survey. It should be noted that it was not possible to conduct manual counts at all intersections in West Oakland and, consequently, truck survey estimates are not definitive for all of West Oakland and only represent a snapshot of truck traffic during the times and dates in which the survey was conducted. However, even given these caveats, there are clearly significant differences in truck traffic volumes between the HRA and this truck traffic survey.

Table 13. Truck Counts Comparisons along Select Intersections (Counts from 7 a.m. to 6 p.m.)

Main Street	Starting Street to Destination Street	Estimated HRA Truck Count	West Oakland Truck Survey Truck Count
West Grand Ave	Frontage to Mandela	3,025	743 / 628 *
West Grand Ave	Mandela to Frontage	3,025	456 / 718 *
West Grand Ave	Mandela to Adeline	2,300	374
West Grand Ave	Adeline to Mandela	2,050	458
West Grand Ave	Market to San Pablo	1,700	132
West Grand Ave	San Pablo to Market	1,600	239
Market Street	West Grand to 16th	2,000	88
Market Street	16th to West Grand	1,450	172

Note: * Manual counts from 2 intersections: (1) West Grand and Frontage and (2) West Grand and Mandela.

The District also compared the fraction of trucks associated with Port activity from the HRA to those of the truck survey. In the HRA, Port trucks contribute 3% of the diesel emissions[2] on both

[2] In the HRA, Port trucks were estimated to emit 4.9 tons per year of diesel PM traveling on surface streets and 2.8 tons per year on freeways, or 7.7 tons per year out of a total of 265 tons per year from all Port-related sources. (Part I emissions Summary by Category, p. A-2 in Appendix A.)

freeways and surface streets and represent approximately 6%[3] of all heavy heavy duty trucks. This appears to under-estimate the Port's contribution since the survey found that Port trucks represent approximately 51% of all medium heavy and heavy heavy duty trucks on surface streets.

Generally, the HRA estimates of truck volumes were higher than findings from the truck survey, which corroborates the HRA's participant's suspicions regarding traffic volume over-prediction on surface streets using a TDM. It also appears that the Port's contribution on surface streets may have been under-predicted. This is consistent with the recommendation of the HRA report that the District continue to work with the community and the Port to implement further studies in order to reduce the uncertainty associated with estimates of truck activity levels in West Oakland. The District attempted to quantify the impact these differences may have on truck contribution and in particular, the Port's contribution on the overall population-weighted risk. However, before the risk could be estimated, the District had to first estimate the VMT for Port and non-Port trucks on surface streets. These calculations are presented in Section 5.

4.2 TRAFFIC VOLUMES ON FREEWAYS

For the freeway volumes along I-880, the District relied on three data sources including PeMS, which provides automatic measurements of all traffic made at various points on I-880; manual counts made of trucks on the freeway and on freeway entrances and exits; and video footage of I-880 taken from the West Oakland BART platform. For I-980 and I-580, manual truck counts along each freeway were used. The manual counts from I-980 and I-580 were linearly extrapolated to reflect counts from 7:00 am to 6:00 pm. Appendix C presents a more detailed description of how the traffic volumes were estimated on freeways.

Figure 22 presents the estimated truck volumes for each freeway. Approximately 2,100 to 2,600 trucks travel daily (7:00 am to 6:00 pm) on I-580 and I-980. About one to three percent (less than 60 trucks per day) of I-580 and I-980 truck traffic is associated with Port activities. A majority of the Port trucks use the I-880 freeway to access the Port. The District estimates that on average 9,700 trucks (medium heavy duty and heavy heavy duty) travel daily on I-880 (combined from northbound and southbound directions). Of the 9,700 trucks, approximately 37%, or 3,600 trucks, are associated with Port activities.

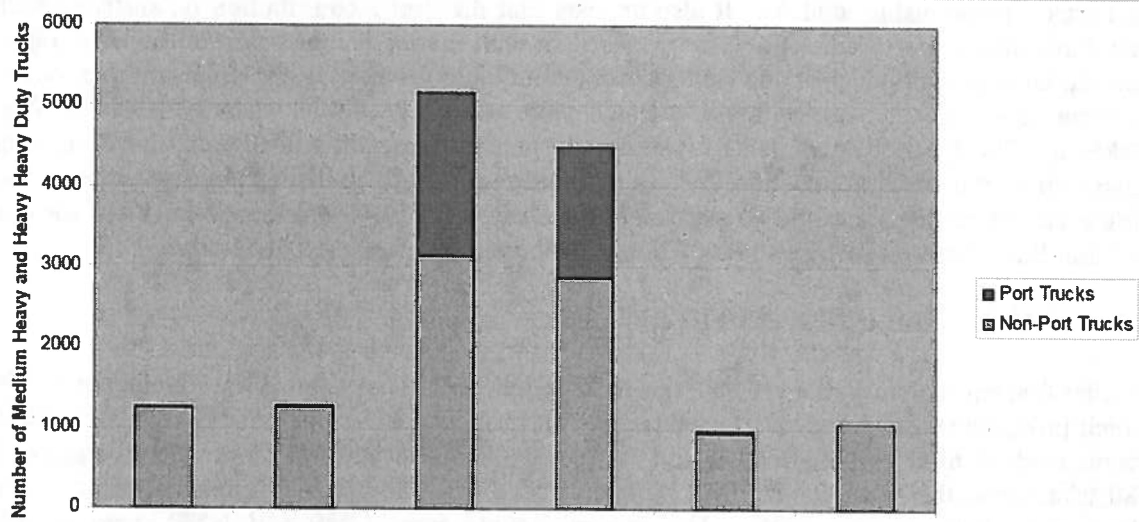
A previous truck study (TIAX, 2003) sponsored by the WOEIP approximated that 6,300 trucks enter the Port per day from surface streets and freeway ramps in West Oakland. By combining the freeway and surface street estimates from this survey, the District estimates that approximately 7,300 Port trucks travel daily through West Oakland. Overall, the studies compare well. Cargo shipments at the Port have steady declined since the study was completed in August 2008 due to the economic downtown with the highest reported shipment reduction of 6.4% occurring in 2009.

Table 14 presents a comparison of the freeway traffic volumes from this survey and estimates based on data used in the HRA. The freeway volumes on I-580 used in the HRA are consistently

[3] Emissions based on year 2001 as presented in Table II-14 (page 33) of CARB's Proposed Emission Reduction Plan for Ports and Goods Movement in California (March 21, 2006).

three times higher than the survey results. For I-980, the difference is not as large with the HRA estimates being roughly two times higher than the survey. The freeway traffic volumes on I-880 were lower in the HRA compared to the survey. The survey recorded almost twice as many trucks on northbound I-880 and 1.4 times more trucks traveling on southbound I-880.

Figure 22. Estimated Freeway Traffic Volumes around West Oakland



* Note: Counts on I-580 and I-980 were conducted from 8:00 am to 12:00 pm and from 9:00 am to 4:30 pm, respectively. The counts were then extrapolated to reflect daytime counts from 7 am to 6 pm.
** I-880 North and South counts were estimated using a combination of manual counts, video footage, and PeMS.

Table 14. Comparison of Freeway MHD and HHD Truck Counts

Description	HRA Estimate (# of Trucks)	Truck Survey Estimate (# of Trucks)
I-580 East*	3,600	1,300
I-580 West*	4,100	1,300
I-880 North	2,400	5,200
I-880 South	3,300	4,500
I-980 North*	2,400	970
I-980 South*	2,100	1,100

* Counts on I-580 were conducted from 8:00 am to 12:00 noon and along I-980 from 9:00 am to 4:30 pm. Each was extrapolated to reflect daytime counts from 7:00 am to 6:00 pm.

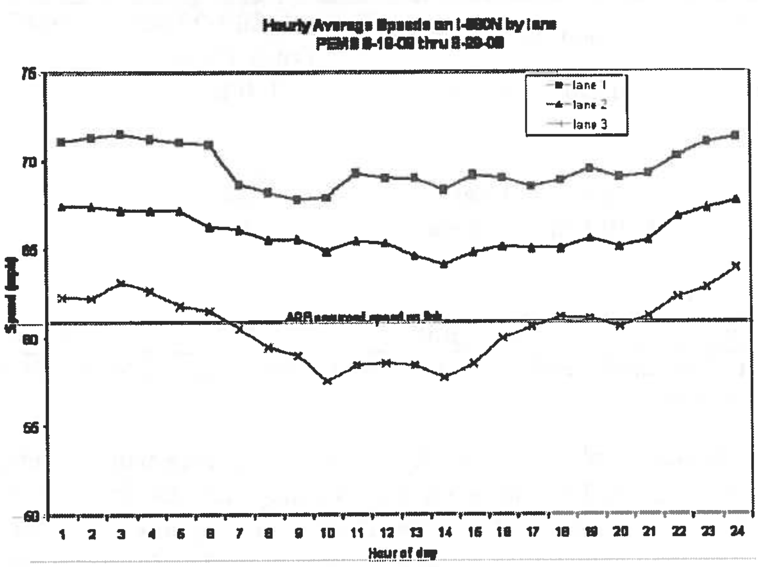
The fraction of Port trucks along each freeway varied significantly. The survey found that almost 37% of the trucks on I-880 and less than three percent on I-580 and I-980 are Port trucks. The HRA assumed that approximately 6% of all heavy heavy duty trucks on freeways and surface streets are Port trucks. Generally, the HRA truck volume estimates were higher than findings from the truck survey. However, because individual freeway contributions were in some cases higher or lower than assumptions used in the HRA, the overall net impact on the risk contribution from freeways can not be predicted without further analysis that is addressed in Section 5. It appears that the contribution to overall risk from Port trucks on freeways may have been under-predicted in the HRA. Section 5 estimates the forecasted changes to risk using the freeway volumes determined in this survey.

4.3 TRAFFIC SPEEDS

The District measured average speeds per hour at four intersections using automatic counters and found little variability between intersections or by time of day. The average vehicle speed independent of weekday or weekend activity ranged from 22 to 40 mph with a total average speed of 30 mph on surface streets in West Oakland. The HRA used speed classifications of 10, 15, 18, 20, 25, 30, 45, 55, and 60 miles per hour (mph) to represent a range of vehicle travel modes from idling, to low to moderate roadway, to freeway travel. Two of the four surface street intersections where automatic counters were installed have assigned speeds of 25 mph in the traffic network used in the HRA. This comparison suggests that the HRA's speed classifications for surface streets were relatively consistent with the findings of the truck survey.

For freeway traffic, the District did not collect direct vehicle speed data. The District instead relied on the PeMS database to compare freeway speeds specifically for I-880. PeMS logs average hourly vehicle speed by lane. Figure 23 shows hourly average freeway speed on northbound I-880 by lane from August 18 through 29, 2008. Lane 1 situated the nearest to the median (commonly called the "fast lane" or "passing lane") shows average speed of about 70 mph. Lane 2, the middle lane, has an average speed of 65 mph and Lane 3 ("slow" lane or merging lane) has an average speed of about 60 mph. The PeMS database does not provide vehicle specific speeds so the results may not be reflective of truck speeds. The HRA assigned truck traffic on freeways a speed of about 60 mph, consistent with speeds in Lane 3 of I-880. Based on these comparisons, the speeds used in the HRA are consistent with the findings of the survey and no adjustment to the HRA is recommended.

Figure 23. Hourly Average Speeds on I-880



4.4 TRUCK IDLING

The District received responses from seven local businesses in West Oakland concerning their idling activity. Reported idling times ranged from 0 to 30 minutes, and only one facility reported idling times in excess of 10 minutes. STI also verified the results by conducting curbside field observations of a majority of the businesses and at three popular mobile lunch corners located on 3rd Street/Market Street, Maritime Street/14th Street, and 11 Burma Road (truck scales). The results from these field observations and the survey sheets show that the majority of the businesses are complying with the five minute idling regulation and that the outreach by community members and government entities is effective. The results are also consistent with the earlier STI survey completed in 2007.

In addition to idling activity, the survey also requested information on the number of daily truck trips generated by local businesses. Table 15 show a comparison of the responses received from the survey conducted by STI in 2007 versus the current survey responses. The 2008 responses were consistent with the previous 2007 survey with one exception. The US Postal Service reported 68 daily truck trips in the 2008 survey, in contrast to 1,034 daily truck trips reported in 2007. In follow-up discussions, the Postal Service has stated that they operate a total of 68 trucks, but these trucks make more than one trip per day and there are additional trucks as well that make trips to the distribution center to ship packages. The manual counts conducted at 7th and Wood Street across from the US Postal Service main service truck gates were generally consistent with the 2007 survey. Counts tallied a total of 1,843 trucks over two days at the 7th and Wood Street intersection with about 922 trucks trips to or from the Post Office during the hours of the survey, which excluded activity before 8:00 a.m. The OMSS facility reported an increase of 12% (150 additional truck trips) as compared to 2007. For the other lower activity sites, the number of truck trips was relatively consistent with activity levels from the previous survey.

Table 15. Comparison of Daily Truck Trips for Oakland Businesses

Location/Company Name	Street Address	Current (2008) Daily Truck Trips	2007 Daily Truck Trips
Oakland Maritime Support Services (OMSS)	11 Burma Road	1,400	1,250
US Postal Service	1675 7th Street	> 922*	1,034
Tighe Drayage Company (Eighteen Trucking)	2230 Willow Street	4	3
A V Trucking Company	1155 3rd Street # 300	5	Low Activity Site

* Based on manual counts. Year 2008 survey results from the Post Office incorrectly reported trucks owned (68 trucks). instead of daily truck trips.

Overall, the survey indicates local businesses have been complying with the idling regulation. This compliance can be attributed to the active campaigning initiated by community members including WOEIP and local government. The District has sponsored several educational programs in the Bay Area and contributed to the San Francisco Bay Area Ditching Dirty Diesel

Collaborative. The Alameda County Congestion Management Agency is also sponsoring a Truck Parking Facility Feasibility and Location Study to better understand truck parking requirement in order to reduce traffic congestion in Alameda County. The Port of Oakland is also considering moving truck support services to Port property away from the community.

4.5 TRUCK AGE DISTRIBUTION

During the manual counts, counters recorded a total of 7,324 truck licenses in West Oakland over the course of the truck survey. Licenses from non-California registered and non-operational trucks were removed from the final data set. The remaining 5,589 licenses, which includes duplicate licenses, were cross-referenced with 2009 California Department of Motor Vehicles (DMV) registration database which provided information on each truck's model year, fuel type, city of registration, zip code of registration, and weight (gross vehicle weight rating – GVWR and number of truck axles), if available.

The median and average model year for all trucks and diesel-powered trucks identified during the West Oakland truck survey was 1997, which is identical to the 50th percentile truck age determined in ENVIRON's Seaport Air Emissions Inventory Study (2008) for the Port of Oakland. Approximately 78% of the trucks in this survey have model years of 1994 or later, which under CARB's adopted regulation to control emissions from in-use on-road diesel-fuel heavy-duty drayage trucks would be required to install retrofit devices on their engines if these trucks transport goods from the Port. In addition, drayage truck engines of 1993 or earlier are required to be phased out by 2010.

The weight classifications of the truck where the license plates, truck age, and weight classification were provided are shown in Table 16. A majority of the trucks fit the drayage truck GVWR category of greater than 33,000 pounds.

Table 16. GVWR Distribution

Gross Vehicle Weight Rate (GVWR)	Number of Trucks	% of Trucks
<6000	57	2%
6,000 to <33,000	663	23%
>33,000	2218	75%

A majority of the trucks, approximately 3,576 registered licenses, were found to be registered in the Bay Area. There were 899 trucks registered in Oakland, 289 in San Leandro, 268 in San Francisco, and 289 in San Jose. Of the 2,013 trucks registered outside of the Bay Area (in California), 175 trucks were registered in Sacramento and West Sacramento, 68 in Fresno, 283 trucks in Modesto, 283 in Stockton, and 65 in Tracy.

Following the District's West Oakland Truck Survey, the Port of Oakland conducted an independent truck age survey in October/November 2008 by recording licenses of trucks entering terminal gates. Of the 1,997 unique license plates that were recorded at the Port's terminal gates, 1,817 of the licenses were registered in California and had vehicle model years available from the 2009 DMV database. Duplicate licenses were removed by the Port prior to comparisons to DMV records. The age distribution and fuel type from the licenses recorded in the Port's truck age survey are shown in Table 17 and Figure 24. The median and average model year from all truck licenses recorded by the Port near terminal gates was 1998 which is one year (1997) newer than the findings from this West Oakland Truck Survey, where duplicates were retained. In a previous Port truck age survey conducted in October 2006 (ENVIRON, 2008), over 80% of the Port trucks had model years from 1993 through 1999. This 2008 Port survey found that 48% of trucks near the terminal gates had model years from 1993 to 1999 and over 37% of the trucks had model years newer than 1999. Figure 25 shows a similar age distribution of trucks surveyed from this West Oakland Truck Survey (with and without duplicate counts) and the Port's 2008 Truck Age Survey near Terminal Gates.

Table 17. Age Distribution and Fuel Type of Trucks Entering or Exiting Port of Oakland Terminal Gates (Port 2008 Truck Age Survey)

Model Year	Number of Trucks	Fuel Type		
		Unknown	Diesel	Gasoline
1970	1		1	
1971	1		1	
1974	1		1	
1975	1		1	
1980	2		2	
1981	4		4	
1982	5		5	
1983	3	1	2	
1984	9		9	
1985	22		22	
1986	16		16	
1987	10		10	
1988	21		20	1
1989	37		37	
1990	29		29	
1991	35		35	
1992	39		39	
1993	71		71	
1994	136		136	
1995	143	1	142	
1996	145		145	
1997	169	1	168	
1998	175	2	173	
1999	209		209	
2000	200	1	199	
2001	111	1	110	
2002	66		66	
2003	51		51	

Model Year	Number of Trucks	Fuel Type		
		Unknown	Diesel	Gasoline
2004	23		23	
2005	22		22	
2006	20		20	
2007	19		19	
2008	4		4	
2009	17		17	
Totals	1,817	7	1,809	1

Figure 24. Age Distribution and Number of Diesel-Powered Trucks Entering or Exiting Terminal Gates (Port 2008 Truck Age Survey)

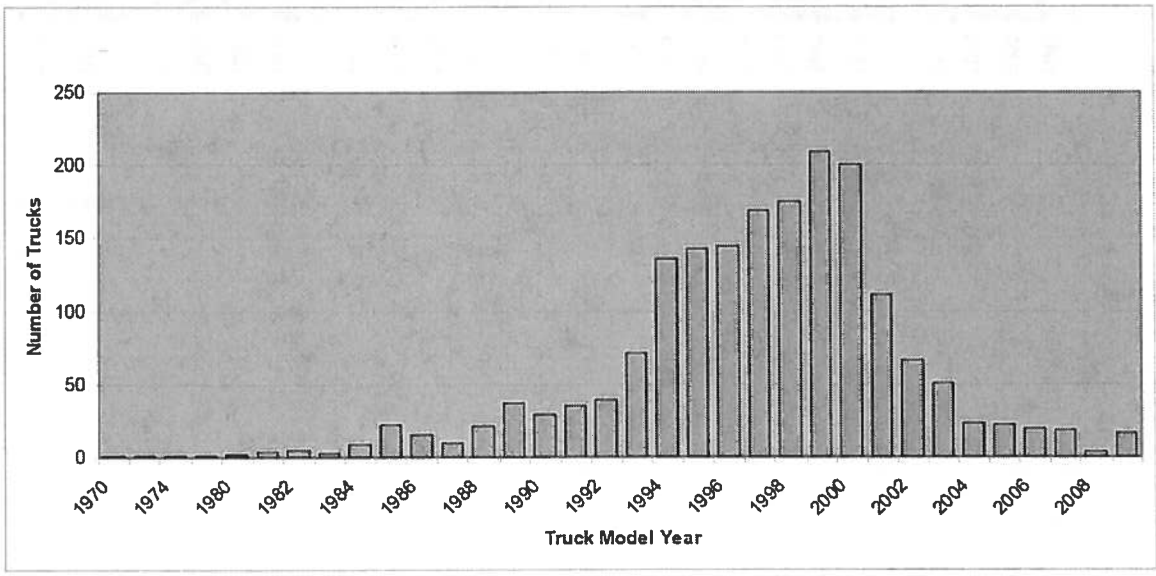
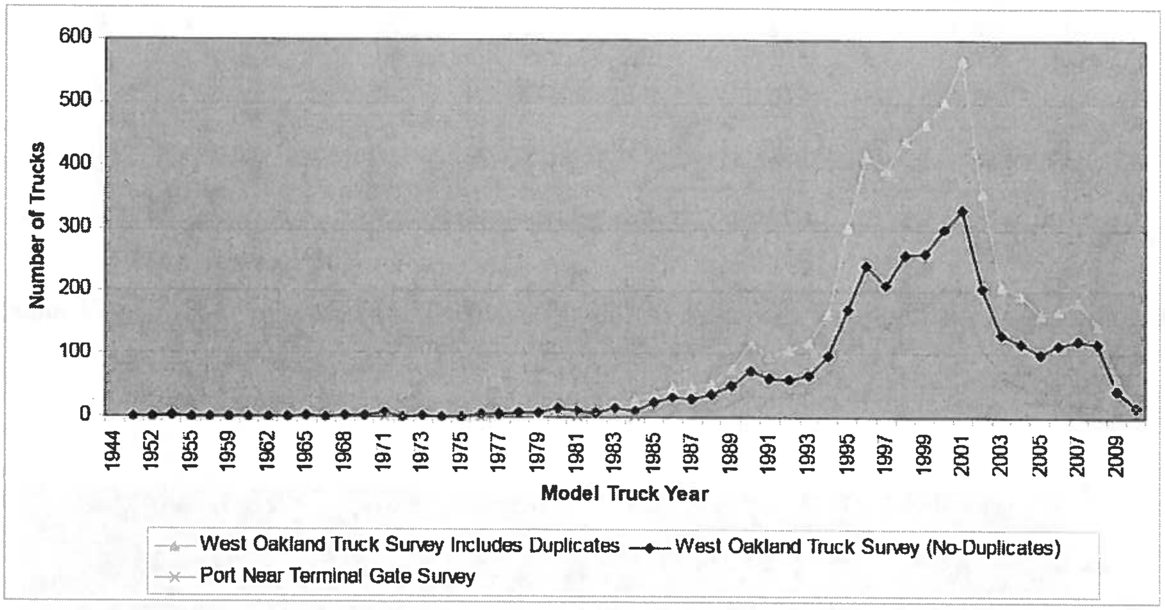


Figure 25. Comparison of Truck Age Distribution from the West Oakland Truck Survey and the Port 2008 Truck Age Survey



5. RE-VISITING THE HRA

One of the recommendations in the West Oakland HRA was to consider revisiting findings from the risk assessment if new information about trucking operations significantly deviates from the assumptions used in the HRA. Based on the results and comparisons in Section 4, the District surmised that sufficient new data was available that would impact the HRA. Rather than conducting a time intensive rerunning of the models, the District instead performed off-model calculations to estimate the change in the risk based on the new data. This section presents re-evaluation of the risk estimates in the HRA based on following changes:

- Decreasing the number of trucks on surface streets;
- Decreasing the number of trucks on freeways I-980 and I-580;
- Increasing the number of Port trucks on surface streets; and
- Increasing the number of Port and non-Port trucks on freeway I-880.

In order to quantify the impact these changes have on the risk estimates in the HRA, the District estimated Port and non-Port truck VMT on surface streets based on the survey results. These estimates were then ratioed against VMT used in the HRA. For freeway estimates, the District used the actual truck counts to ratio the risk from the HRA. Detailed descriptions of these calculations are provided in the following sections.

5.1 ESTIMATING VMT ON SURFACE STREET AND COMPARISONS TO HRA

In Section 4.1, the District estimated truck volumes on surface streets based on manual counts and truck routes derived from GPS tracking data in Port trucks and the District's limited truck-following study. The data provided an estimate of most of the traffic volume in West Oakland; however, it did not account for the variable traffic patterns of the entire fleet of non-Port trucks. The GPS data was not used to estimate the VMT. Instead, the District extrapolated the individual manual counts at each street intersection to estimate the VMT on surface streets.

The District estimated VMT in West Oakland for all MHD and HHD trucks and for those assigned to the Port. Figures 26 and 27 present the summed counts of all trucks and Port trucks, respectively, on each block that was surveyed and extrapolated counts to non-surveyed local streets. As discussed in Section 2, the manual truck survey counted MHD and HHD trucks and recorded their movements at 38 street intersections in West Oakland. Although not a random sample, the intersections surveyed included all the streets with two or more lanes in each direction. The counts were categorized into five bins representing highest to lowest activity levels, represented by colors from red through blue. Except for a section of West Grand Ave., the highest trafficked (red) street segments are all entrances and exits to the Port and I-880. Virtually all non-multilane streets had counts in the lowest fifth (blue).

To estimate VMT, individual counts for each street were multiplied by the length of the street as shown in Figures 26 and 27. The District used five trucks per day as the minimum truck traffic for non-surveyed, two lane intersections. For non-surveyed intersections with more than two lanes, 20 trucks per day were assumed. Because the starting point for this method was truck counts at the intersections, the network is approximately balanced (approximately equal portions of trucks entering and exiting the intersection at any given time) at the major intersections that were surveyed. The VMT excluded traffic in the Port and on the surrounding freeways. VMT was estimated for weekday traffic during the daytime, 7 am – 6 pm, when the counts were conducted. The District estimated a VMT of 7,900 for all trucks by combining the average counts for each bin by the street length. Port trucks within the same boundary had an estimated VMT of 3,050.

Figure 25. Survey Counts of MHD and HHD Trucks at Sampled Intersections (left) and Extrapolated to the Roadway Network (right)

Note: Colors correspond to ranges numbers of trucks: red ≥ 900, orange 275-900, yellow 175-275, green 60-175, and blue < 100.

Figure 26. Survey Counts of Port Trucks at Sampled Intersections (left) and Extrapolated to the Roadway Network (right)

Note: Colors correspond to ranges of 24-hour VMT: red ≥ 900, orange 300-900, yellow 100-300, green 20-100, light blue ≤ 20, and blue ≤ 5.

West Oakland has approximately 834 street blocks that if laid end to end would extend for approximately 67 miles. A typical round trip around the periphery of West Oakland is approximately one to 1.5 miles and the distance from the Port to the freeway on-ramp ranges from 0.5 to one mile. From Section 4.1, the District estimates approximately 7,200 trucks and 3,700 Port trucks travel daily through West Oakland on surface streets. As a comparison to the method described above, rough estimate of VMT for all trucks driving on the periphery ranges from 7,200 to 10,800. For Port trucks, the estimated VMT based on such a calculation would be 1,850 to 3,500. Both estimates are consistent with the survey-estimated VMT of 7,900 for all trucks and 3,050 for Port trucks.

The District compared the VMT from the survey to that used for the HRA. CARB provided a database showing the entire roadway network used in the HRA that includes speeds, link length, hour, and VMT used to generate the diesel emissions estimates. The HRA used the Travel Demand Model that utilizes population, employment, surveys, income, roadway and transit networks, and transportation costs to forecast traffic volumes and speeds. These activities are assigned to roadway links that represent fleet population and average speed on a specific freeway, ramp, or major or minor arterial. Not every link represents an actual street; instead, some links represent activity levels anticipated for an area encompassing several city blocks. The roadway network used for the HRA and associated VMT are shown in Figure 28.

Figure 28. Roadway Links and VMT Used in the West Oakland Health Risk Assessment

Note: Colors correspond to ranges of 24-hour VMT: red ≥ 5000, orange 1500-5000, yellow 500-1500, green 100-500, blue < 100.

The HRA predicted an estimated 472,000 VMT per day within West Oakland with a majority of the traffic traveling on freeways. Excluding freeways, 52,400 VMT per day are on surface streets between the hours of 7 a.m. and 6 p.m. Compared to the 7,900 VMT estimated from the survey, it appears that the estimated surface street traffic volume used in the HRA is almost seven times higher than the findings from the West Oakland truck survey. This comparison corroborates suspicions of the HRA's participants that the traffic volume was over-predicted on surface streets using the Travel Demand Model. The next section discusses adjustments to the risk based on these findings.

5.2 ESTIMATION AND COMPARISON OF RISK

This section synthesizes the surface street VMT and freeway counts derived from the truck survey and compare them to the West Oakland HRA to evaluate their implications for health risk and for setting emission-reduction priorities. Section 4.0 reported two main findings that will impact risk estimates. First, the truck volumes and thus the VMT (Section 5.1) from MHD and HHD trucks, which contribute nearly all the emissions from heavy duty trucks in West Oakland, were overestimated in the HRA. Second, the Port contribution was underestimated. These findings support the concerns raised in the HRA that the emissions from Port trucks might be underestimated since the Port-truck operations within the community were not studied in detail and were assumed to travel on freeways without using minor arterials or secondary roadways. To assess implications for health risk, the analysis below derives ratios of the surface street VMT and freeway truck counts (Section 4.2) derived from this survey to those from the HRA to scale the HRA health risk numbers. Such comparisons were used to adjust the risks, from Port and non-Port on-road trucks on surface streets and freeways, to approximately reflect the findings of this survey.

5.2.1 Adjusted Freeway Risk

The survey collected actual MHD and HHD truck counts on all major freeways surrounding West Oakland. The survey did not include counts of LHD trucks represented by sport utility vehicles and pickup trucks. When the District weighted the VMT of LHD vehicles by their emissions factors, they were found to contribute less than 1% of the total emissions from diesel vehicles on both local streets and freeways and thus re-evaluation of LHD emissions was deemed unwarranted.

On all the major freeways (I-880, I-580, and I-980), manual traffic counts were used to determine Port and non-Port truck volumes. The freeway estimates used to adjust the health risk were strictly taken from the manual counts and did not incorporate the PeMS data or video footage counts. The following discussion provides a step by step process that was used to adjust the HRA data with the survey results in order to revise the risk along freeways from MHD and HHD trucks.

Freeway Step 1: In the first step, the District estimated the volume of trucks used in the HRA that travel on each freeway for the time period corresponding to the survey. CARB provided Transport Demand Model (TDM) data files containing the link identification, link length, name of freeway or street, speed, number of lanes, mile length of the link, time, and VMT within West Oakland for each segment used in HRA. The District used these data to estimate a total VMT and mile length for each freeway by the hour of the day. The truck count was estimated by dividing the total VMT by the mile length for each hour. The truck counts from the HRA were derived to match the hours for which the survey was performed: 7:00 am to 6:00 pm.

Freeway Step 2: The District then estimated the number of MHD and HHD trucks used in the HRA per freeway link. The volume of each type of truck was estimated by multiplying the VMT fraction (see Table 19) of MHD and HHD trucks by the total number of trucks along each link (Step 1). The VMT fraction is generated from the EMFAC model, a statewide model used to estimate on-road motor vehicle emissions. The fraction represents the portion of the VMT attributed to each size category of trucks. Note the emission contributions from LHD diesel were omitted in this process; while LHD truck VMT is significant overall in California, because of their relatively low emission factors, their emission contributions are less than 1% of the total diesel emissions from all vehicles in West Oakland.

Table 18. VMT Fraction of All Trucks Attributed to MHD and HHD Trucks

Vehicle Type	VMT Fraction
MHDT-Diesel	0.255
HHDT-Diesel	0.442

Table 19 presents the estimated MHD and HHD trucks used in the HRA for each freeway for the time period corresponding to the survey. Truck traffic volumes on Freeway I-80 were included in the original HRA but were not counted in this survey. For subsequent analyses, I-80 volumes from the HRA were not changed.

Table 19. Volume of Trucks and Diesel Fraction for each Freeway Based on HRA

Freeway	HRA MHD and HHD Truck Volumes	Fraction of Total Truck Volumes and Emissions Attributed to Each Freeway
580 E	3574	0.13
580 W	4114	0.16
880 N	2447	0.092
880 S	3299	0.12
980 N	2427	0.092
980 S	2138	0.081
80 E	4266	0.16
80 W	4245	0.16
Total Number of Trucks Traveling on Freeways in West Oakland	26,510	100%

Freeway Step 3: The next step was to estimate the fraction of the total truck volumes in West Oakland that is attributed to each freeway. Diesel emissions are estimated based on the number of vehicles and by knowing the fraction of trucks, the fraction of diesel emissions attributed to each freeway is known. The District estimated the fraction of trucks on each freeway by dividing each freeway truck volume by the cumulative truck volume from all freeways in West Oakland. For example, there are 3,574 MHD and HHD trucks on eastbound I-580. The total number of MHD and HHD trucks that travel on all freeways that intersect West Oakland is

26,510 (HRA-based estimate). By dividing the individual freeway volumes by the cumulative truck volumes from all freeways, the fraction of truck volume and likewise the fraction of diesel emissions attributed to I-580 east is 0.13 (3,574/26,510). Table 19 presents the estimated fraction of total truck volume and hence, diesel emissions, for each freeway segment in the HRA.

Freeway Step 4: The next step was to compile the Port (includes chassis, containers, and bobtails) and non-Port truck volumes on each freeway based on the truck survey and compare the results to the HRA truck volumes corresponding to the survey hours. Because surveys were not conducted along I-80, the truck volumes used in the HRA for I-80 were retained in this analysis. For the surveyed freeways, the actual counts on each freeway are shown in Table 20 and are reflective of the hours listed below. CARB's TDM file contained hourly data that the District used to derive truck counts from the HRA corresponding to the same hours in which observations data from the truck survey were collected.

- I-580 freeway: 8:00 am to 12:00 noon
- I-980 freeway: 9:00 am to 4:30 pm
- I-880 freeway: 8:00 am to 8:30 am, 9:00 am to 9:30 am, 10:00 am to 11:00 am, 1:30 pm to 2:00 pm, 2:30 pm to 3:00 pm, and 3:30 pm to 4:30 pm.

Table 20. Truck Volumes Based on Survey, for Survey Hours

Freeways	Number of Port Trucks from Survey	Number of Total Trucks (Port and Non-Port) from Survey
580 E	4	458
580 W	2	463
880 N	721	1840
880 S	576	1617
980 N	21	664
980 S	8	729

Table 21 presents the HRA truck volumes for each freeway for the hours matching the survey (fewer trucks than shown in Table 19 due to the reduced hours).

Table 21. Truck Volumes Based on HRA for Survey Hours

Freeways	Number of Total Trucks (Port and Non-Port) from HRA
580 E	1402
580 W	1616
880 N	872
880 S	1176
980 N	1764
980 S	1556

Freeway Step 5: The District then developed revised diesel emissions based on the survey by scaling the HRA diesel emission fractions. This was done by multiplying the diesel fractions in Table 19 by the ratio of the survey truck volumes (Table 20) to the HRA truck volumes (Table 21) per freeway. The ratios presented in Table 22 are then summed and multiplied by the population-weighted potential cancer risks in West Oakland (see Step 6). The contribution from Port trucks was estimated by scaling the ratios shown in Table 22 by the fraction of trucks that are Port related (Table 20). The fraction of Port trucks along I-80, which was not surveyed, was assumed to be 14%, estimated by using the average Port fraction from all the surveyed freeways.

Table 22. Adjusted HRA Diesel Fractions Based on Survey

Freeways	Adjusted HRA Diesel Fraction for All Diesel Trucks Based on Survey	Diesel Fraction for Port Trucks Based on Survey
580 E	0.044	0.00038
580 W	0.049	0.00021
880 N	0.12	0.046
880 S	0.15	0.052
980 N	0.048	0.0015
980 S	0.052	0.00057
80 E	0.16 (no change from HRA)	0.022*
80 W	0.16 (no change from HRA)	0.022*
Total	0.78	0.14

Note: * Fraction of Port trucks along I-80 was estimated by applying the average percentage of Port trucks observed from all surveyed freeways.

For example, 580 E has an adjusted diesel fraction of 0.044 which was estimated by scaling the HRA diesel fraction of 0.13 (Table 19) by the ratio of surveyed truck volumes (Table 20) to the HRA truck volumes (Table 21) (0.13 x 458/1402). Because of the reduced number of observed trucks on I-580 and I-980, the overall adjusted diesel fraction reflects a reduction of the population-weighted risk from the HRA of 78%.

Freeway Step 6: The final step was to estimate the change in population-weighted risk from the HRA based on the survey results. It should be noted that the adjustment is a rough estimation and does not preclude the possibility of one conducting a more complete and rigorous re-modeling of the emissions in the future. In the HRA, diesel sources were allocated in three parts with Part I including only diesel emissions from Port operations. Part II incorporated sources related to the Union Pacific Railyard and Part III encompassed the remaining sources, not in Part I or II, such as ocean going vessels destined for San Francisco Bay ports (other than the Port of Oakland), on-going heavy-duty trucks not transporting goods to and from the Port, harbor craft and ferries, and local distribution centers. The District had to first determine the portion of the cancer risks in the HRA that is attributed to freeway travel of Port trucks (Part I) and non-Port trucks (Part III). The population-weighted risk in Part III from non-Port trucks traveling on freeways and surface streets was 795 cases per million (Table 7; CARB, 2008). CARB estimates based on the TDM files that approximately 74% of the VMT are associated with freeways and the remaining 26% are from surface streets. If one assumes a linear increase in miles driven leads to increased emissions and potential risk, then 74% of the 795 cases of cancer in a million or 588 cases in a million, are associated with non-Port truck activity on freeways.

In Part I of the HRA, the population-weighted cancer risk from Port trucks on surface streets, freeways, idling at the gate and terminals, terminal movements, and support services is 42 cases in a million. A similar methodology of scaling the risk based on VMT as applied to non-Port trucks above could not be used for Port sources since detailed VMT information was not available. Instead, the District scaled the cancer risk based on the fraction of diesel emissions associated with Port trucks traveling on freeways. From Part I of the HRA, Port trucking operations emit 20 tons per year (tpy) based on travel to and from surface streets and freeways, and at terminals and gates. About 2.8 tpy of the 20 tpy are from Port trucks traveling on freeways. The fraction of the total diesel emissions attributed to the freeway is then 0.14 (2.8 tpy/20 tpy). Assuming a linear relationship between emission and cancer risk, approximately 14% of the total cancer risk associated with Port activities is due to Port trucks driving on freeways. This equates to population-weighted cancer risk from Port trucks on freeways of 5.9 cases in a million (0.14 x 42 cases in a million). The total population-weighted cancer risk from trucks driving on freeways was estimated by summing the contribution from Port trucks in Part I (5.9 cases in a million) and non-Port trucks in Part III (588 cases in a million) of the HRA for a total cancer risk of 594 cases in a million.

The revised population-weighted cancer risk was estimated by multiplying the total cancer risk attributed to freeways of 594 cases in a million (from the HRA) by the adjusted diesel fraction estimated from the survey findings (see Table 22). The survey found that the cancer risk contribution from freeways was overestimated by 22%. The Districted estimated that the final adjusted population-weighted risk is 462 cases in a million (594 cases in a million x 0.78) for diesel trucks traveling on freeways in West Oakland. In addition, the survey showed a corresponding 11-fold increase from the HRA cancer risk for Port trucks on freeways. Approximately 14% of the total cancer risk from freeways is attributed to Port trucks (see Table 22) or about 67 cases in a million (0.14 x 462 cases in a million).

In most cases, the survey found only nominal amount of Port trucks on local freeways except along I-880 where on average, 37% of the trucks were associated with Port activity. The District's approach of classifying all bobtails, containers, and chassis trucks as being Port related may slightly overestimate the Port's contribution to the overall risk. The District recognizes that these trucks are used by other businesses in the area. However, it is likely that the number of these trucks used by other businesses is small in comparison to the total fleet used in support of Port activity. The uncertainties with this estimate are discussed further in Section 5.3.

5.2.2 Adjusted Surface Street Risk

To adjust the HRA's estimate of population-weighted risk from trucks on surface streets from the HRA, the District used the VMT representing the total distance traveled by all trucks on surface streets in West Oakland. Section 5.1 presents the detailed analysis used to derive the VMT. On surface streets, truck counts were used to estimate volumes at the block level. The VMT estimates were obtained by multiplying the truck volumes at each intersection by the length of each block. For non-surveyed streets, the District assumed a minimum truck volume of 5 trucks per day on two lane roads and 20 trucks per day on roads with more than two lanes. VMT estimates on surface streets from Port and non-Port trucks were then compared to estimates in the HRA using the following step by step methodology:

Streets Step 1: The first step was to estimate the VMT for MHD and HHD trucks on surface streets used in the HRA. The District summed the VMT corresponding to the hours between 7:00 am to 6:00 pm for all segments designated as surface streets in the TDM file provided by CARB. The District then estimated the portion of the VMT that is attributed to MHD and HHD trucks on surface streets by multiplying the VMT fraction of MHD and HHD trucks (see Freeway Step 1; Table 18) by the total VMT on surface streets. Table 23 shows the estimated VMT by truck classification.

Table 23. Truck Classification VMT on Surface Streets Based on the HRA

Vehicle Type	HRA VMT
MHDT-Diesel	19,139
HHDT-Diesel	33,229
Total VMT for MHD and HHD Trucks	52,368

Streets Step 2: The population-weighted risk in the HRA was then apportioned based on the contributions from Port and non-Port trucks on surface streets. The District had to first determine the portion of the cancer risks in the HRA that is attributed to Port trucks (Part I) and non-Port trucks (Part III) driving on surface streets. As stated in Freeway Step 6, approximately 26% of the VMT in Part III of the HRA are associated with non-Port trucks driving on surface streets of West Oakland. The population-weighted risk in Part III from non-Port trucks traveling on freeways and surface streets was 795 cases per million (Table 7; CARB, 2008). If one assumes a linear increase in miles driven leads to increased emissions and potential risk, then 26% of the 795 cases of cancer in a million or 207 cases in a million, are associated with non-Port truck activity on surface streets.

As previously stated in Freeway Step 6, the methodology of scaling the risk based on VMT as applied to non-Port trucks above could not be used for Port sources since detailed VMT information was not available. Instead, the District scaled the cancer risk based on the fraction of diesel emissions that are attributed to Port trucks driving on surface streets. From Part I of the HRA, Port trucking operations emit 20 tons per year (tpy) based on travel to and from surface streets and freeways, and at terminals and gates. About 4.9 tpy of the 20 tpy are from Port trucks traveling on surface streets. The fraction of the total diesel emissions attributed to the surface streets is then 0.25 (4.9 tpy/20 tpy). Assuming a linear relationship between emission and cancer risk, approximately 25% of the total cancer risk associated with Port activities is due to Port trucks driving on surface streets. This equates to population-weighted cancer risk from Port trucks driving on surface streets of 10.3 cases in a million (0.25 x 42 cases in a million). The total population-weighted cancer risk from trucks driving on surface streets was estimated by summing the contribution from Port trucks in Part I (10.3 cases in a million) and non-Port trucks in Part III (207 cases in a million) of the HRA for a total cancer risk of 217 cases in a million.

Streets Step 3: The final step was to adjust the population-weighted cancer risk from surface streets in the HRA based on the survey results. The revised cancer risk was estimated by multiplying the total cancer risk attributed to surface streets of 217 cases in a million (from the HRA) by the quotient of VMT of the survey finding to the HRA assumptions. From Section 5.1, the District estimated a VMT of 7,900 on surface streets based on the survey. The total VMT for all MHD and HHD trucks on surface streets used in the HRA is 52,368. The final adjusted population-weighted risk for trucks on surface streets is 33 cases in a million; estimated by taking the 217 cases in a million, multiplying by 7,900 VMT from the survey and dividing by the total HRA VMT of 52,368.

To estimate the Port truck contribution to the cancer risk on surface streets, the District scaled the adjusted cancer risk from all trucks of 33 cases in a million estimated above by the quotient of the VMT from Port trucks to all trucks based on the survey. The scaling factor was the ratio of Port truck VMT (3,050 based on the survey results, see Section 5.1) to total VMT from all trucks in the survey (7,900 based on the survey, see Section 5.1). The District found that about 39% of the adjusted population-weighted risk from surface street traffic was attributed to Port trucks or 13 cases in a million (33 cases in a million x 3050/7900).

The adjusted risk estimates for MHD and HHD trucks along freeways and surface streets of West Oakland are presented in Table 24.

Table 24. Adjusted Risk from Freeway and Surface Streets Based on the Survey Results

Freeway and Local Streets	Adjusted Risk (cases per million) from Port Trucks	Adjusted Risk (cases per million) from All Trucks
Freeways (I-580, I-880, I-80, and I-980)	65	462
Surface Streets	13	33

5.2.3 Summary of Adjusted Street Risk

Table 25 presents a summary of the adjusted risk estimates based on the findings from the survey. Part I adjustments in Table 25 were derived from the adjusted risk shown in Table 24 from Port trucks on the freeways and surface streets in combination with off-road Port-related trucking risk that did not change. The unchanged risk includes risk from gate idling on terminal, in terminal truck movement, in terminal idling, and risk from the distribution center (Oakland Maritime Support Services). The unchanged categories sum to a population-weighted potential cancer risk of 25 per million (65 + 13 + 25 = 103). Part II risks did not change. Part III adjustments are the total of all freeway and surface streets in Table 24 minus the risk from on-road Port trucks.

Table 25. Summary of the Adjusted Population Weighted Cancer Risks (Cases per Million) Based on the Survey

Source Category	Part I Port	Part II Union Pacific	Part III Non-Port and Non-UP	Combined
OGV Transiting, Maneuvering, and Anchoring	57	0	23	80
OGV Hoteling	57	0	10	67
Harbor Craft	15	0	78	93
Trucks	**103** (42)	7	**415** (795)	**525** (844)
Cargo Handling Equipment	16	21	7	44
Locomotives	4	15	37	56
Others	0	0	2	2
Total	**252** (192)	**43**	**572** (951)	**867** (1,186)
% Risk	**29%** (16%)	**5%** (4%)	**66%** (80%)	**100%**

Note: Revised risks are noted in bold text. The values in parentheses ( ) are the original population-weighted cancer risks presented in Table 7 of the HRA.

Overall, the combined total population-weighted cancer risk for West Oakland was reduced by 27% to 867 cases in a million. The reduced number of predicted cancer cases based on the survey does not imply that the air quality in the area has improved, but confirms the uncertainties noted in the HRA. Cancer risks in West Oakland still remain one of the highest in the Bay Area. Most of the reduction in the combined cancer risk can be attributed to the seven-fold decrease in VMT on surface streets in the HRA based on the findings from the survey. By revising the overall cancer risk, individual source contribution similarly changed with respect to the total combined risk. Diesel emissions from MHD and HHD trucks remain the largest contributor to the overall cancer risk representing over 61% of the total population-weighted risk in West Oakland (see Table 25) based on the survey. This is lower than the on-road heavy duty truck contribution noted in the HRA of 71%.

Conversely, the Port's contribution to the overall risk increased from 16% to 29%. Most of increased cancer risk is attributed to the higher volume of Port trucks traveling on surface streets and on I-880 as determined through the survey. In fact based on the adjusted cancer risk, Port trucks become the highest single contributor to the cancer risk at the Port, responsible for about 41% of the cancer risk from Port operations. The increased risk attributed to Port activity appears to conflict with the understanding that the Port has experienced an economic downturn in the last several years which could have resulted in reduced overall risk from trucks. The explanation lies in a basic assumption of the HRA that all truck trips leaving the Port of Oakland travel on freeways through the community without accessing minor arterials or secondary roadways. The HRA explicitly states that "this approach may underestimate the magnitude of emissions from trucks serving the Port of Oakland, because port-truck operations within the community are not well characterized even through clearly some are occurring." CARB supported the District in designing this survey in order to reduce the uncertainty in the truck volume estimates. The survey has confirmed concerns discussed in the HRA that the Port's contribution to the population weighted risks were underestimated and conversely, the risks attributed to non-Port and non-Union Pacific trucks were overestimated.

5.3 UNCERTAINTIES

In both the survey and data analysis, several key assumptions were made in order to come to the conclusions presented in Section 5.2. Such assumptions are inherent in efforts to characterize emissions and associated risk in complex settings and can result in uncertainties, under-prediction or over-prediction, in risk estimates. This section identifies some of the major uncertainties associated with methods and assumptions in this survey and assesses their impact on the key findings. The uncertainties have been grouped and are discussed in the following categories:

- Manual Truck Counting Error
- Port Truck Classification
- Seasonal Variation of Truck Traffic
- Non-Surveyed Street Traffic Load

<u>Manual Counting Error</u>

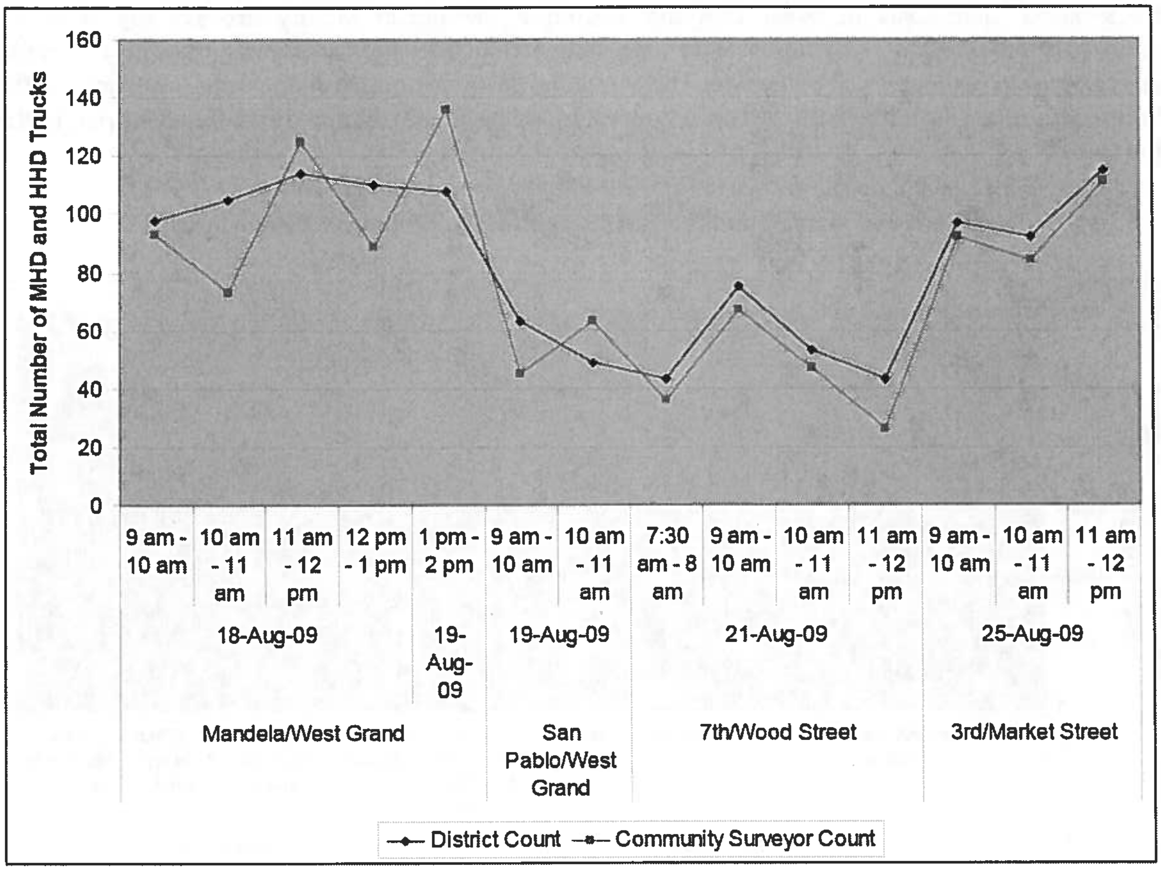
Counters were deployed at designated intersections for five to six hour intervals to count trucks. The counters were trained community members who recorded the number of axles and movements of trucks upon entering an intersection. As with any survey, human errors may occur and the District attempted to minimize the uncertainties associated with the manual counts by arranging to have District personnel serve as secondary counters at high activity intersections. District personnel also attended the same training session as community members. The intersections of Mandela/West Grand, San Pablo/West Grand, 7th/Wood Street, and 3rd/Market Street had secondary counters deployed for durations of one to four hours.

Figure 29 presents a comparison of the total MHD and HHD trucks counted by both District and community surveyors. The results are somewhat variable at the beginning, but for much of the survey, the two counts were relatively consistent. Because only three percent of the manual counts have secondary counts, additional statistical evaluation was not performed. The District recognizes that errors in individual counts are inherent in this process. The effect these differences may have on the results is not known precisely, but it is expected to be minor. Likely any errors of over counting are offset by equal amount of under counting as indicated in the Figure 29. The District believes that the counts are sufficiently accurate for the purpose of this study, which is to improve the roadway emission estimates for West Oakland and adjust the health risk accordingly if significant discrepancies are determined through the survey. The objective of the study is not to focus on counts at individual intersections, but to look at the entire West Oakland area holistically and determine if the study captured the basic travel patterns and traffic volumes for the area.

The District also noted that manual counters likely recorded the same trucks several times in the course of the day as is evident by the numerous duplicate licenses that were captured (see

Section 3.3). This survey meets the District's objective of characterizing the short, local trips that are made by some Port trucks which were not fully represented in the HRA risk estimates. The local trucks are heavily used and are substantial source of diesel emissions in the community. By including the multiple counts from the same trucks, the District is including the impacts from these local truck trips.

Figure 29. Comparisons of Manual Count Results

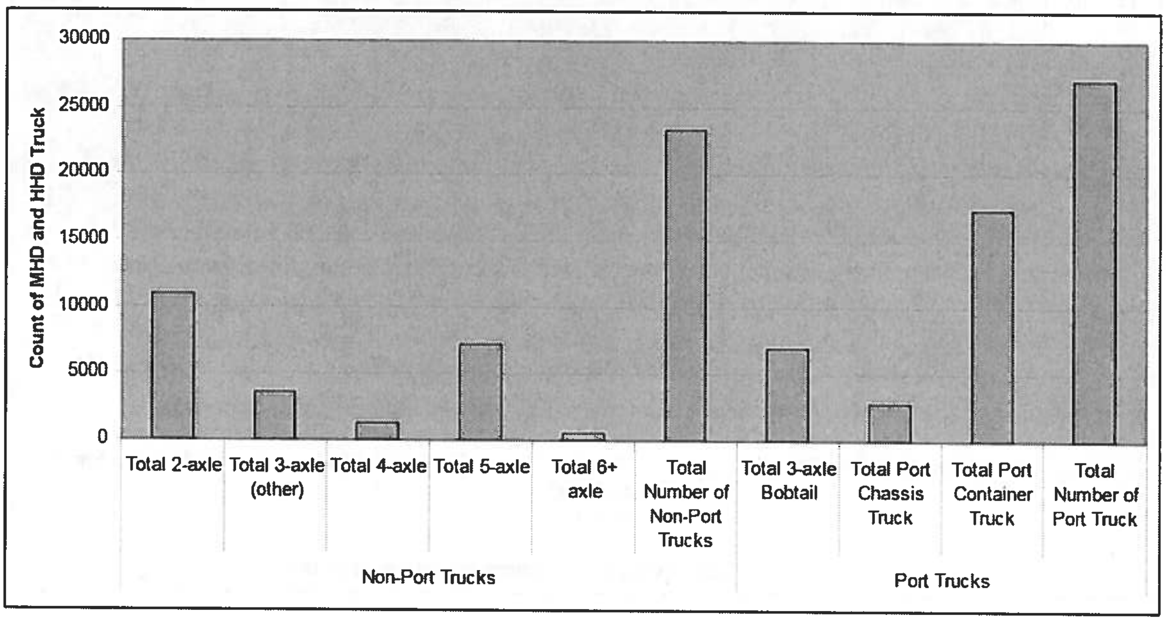


Port Truck Classification

One of the tasks of this survey was to classify trucks as Port or non-Port trucks. In so doing, the District followed CARB's lead when they designed a recent truck survey for the Ports of Los Angeles and Long Beach. In the Los Angeles and Long Beach study and in this study, all bobtails, chassis, and containers were classified as Port trucks. The District recognizes that a portion of bobtail trucks, especially those counted while driving on the freeways, may not be associated with Port activity. Figure 30 presents a breakdown of the total number of trucks that were counted during the survey per category. Bobtails make up a high percentage of the overall traffic in West Oakland representing 14% of all trucks.

The Port likely represents the highest single operation in West Oakland that uses bobtail trucks. There are other businesses in West Oakland that use bobtails including the US Postal Service and the Union Pacific Railyard. The HRA estimated that diesel emissions from Port trucking are approximately 20 tons per year. In comparison, the Union Pacific railyard which may be the second largest single source that uses bobtails has an estimated diesel trucking emissions of 1.9 tons per year (from the HRA) – 10 times lower emissions than the Port. The US Postal Service has a major distribution center in West Oakland that has a fleet of 68 diesel trucks that make approximately 1,000 truck trips per day. The HRA estimated that diesel emissions from all truck-based businesses in West Oakland including the postal facility are 1.9 tpy (Part III emissions inventory) – 10 times lower emissions than the Port. Overall, the Port's diesel emissions overshadow any of the other diesel sources in the area. Allocating a portion of the bobtails to other diesel sources would not result in a significant change in the adjusted risk to the Port.

Figure 30. Total Count of Trucks on Surface Streets by Truck Type



Beside the bobtails, ribbed containers (identified as being Port related in this study) are occasionally used by shipping companies to transport goods. Some commercial businesses use 53 foot long intermodal containers for domestic shipment on rails or by trucks within the United States. These intermodal containers have the characteristic ribbing and corner castings that make them indistinguishable from Port containers. These containers are not used on oceangoing vessels at the Port, but are used occasionally by local businesses to ship domestic cargo at the Union Pacific yard and at least one tenant at the Port stores these containers for their customers. The actual number of businesses that use these containers and the frequency of their shipments are unknown. Overall, this study assumes these containers make-up a small fraction of the total number of container trucks that were counted as Port trucks.

Seasonal Variation of Truck Traffic

The District recognizes that there are seasonal variations in the number of cargo ships that come to the Port and consequently, the number of diesel trucks will also vary by season. The District attempted to verify that during the course of the survey a typical number of ships came to dock consistent with the yearly average. As stated in Section 4.1, the Port of Oakland reported that August typically has the highest number of vessel calls due to the upcoming holiday season. From August 18th to 29th, the Port reported 66 vessel calls - an average of 5.5 vessels per day. For 2008, a total of 1,928 vessels delivered cargo to the Port - approximately 5.3 vessels per day. Based on the comparison, the District concluded that the two week study period of the manual counts on surface streets is representative of typical operating conditions at the Port.

For the freeway counts, the data were collected in December 2008 and May 2009. December generally has the fewest vessel calls and consequently, the freeway counts presented in this survey may be under-representative of annual average traffic volumes on freeways, in which case the adjusted risk for the freeways (and the Port's contribution) may be higher. Port of Oakland staff observed that the "December cargo was at least 14% less than in August" (Anne Whittington, memorandum dated July 1, 2009). The Port reported that in August 2008, 195,000 twenty-foot containers equivalent units (TEUs) passed through the Port. In December 2008, 167,000 TEUs were handled at the Port. The District did not attempt to adjust the risk based on the different survey periods, but speculates that the risk from freeway would increase.

The freeway counts along I-580, I-980, and I-880 occurred on certain days in December 2008 and May 2009. It is unknown whether traffic patterns on these freeways during the survey days are consistent with annual average conditions. The air dispersion modeling that was performed in the HRA used hourly emission estimates and VMT to predict health risks in the West Oakland community. In applying ratios to the health risk estimates, the District is only changing the number of vehicles along each traffic link, but the actual hourly variation in traffic patterns are still intact. Likewise, any seasonal variations that were included in the modeling analysis would still hold true in the adjusted health risk.

Non-Surveyed Street Traffic Load

As discussed in Section 5.1, the District had to estimate the number of trucks that travel on roads that were not surveyed. The District assumed five trucks per day for two lane roads and 20 trucks per day for roads with four lanes. Although there are numerous two-lane roads that were not surveyed in this study, the actual truck traffic that travel on these roads represent a small fraction of the total truck volumes in West Oakland. The survey included counts at all major arterials and most four lane roads. The remaining non-surveyed roads consist mostly of two lane roads and small number of four lane roads that are not frequented by truck traffic, which was confirmed with community members that assisted in designing the truck survey. Overall, counts from non-surveyed roads contributed less than three percent to the VMT on surface streets.

6. CONCLUSIONS

With guidance from CARB, the District initiated this truck survey to address uncertainties that were identified in the HRA. The HRA stated that information used to derive on-road truck emissions inventories associated with the Port of Oakland and trucking operations in the West Oakland community was limited. One of the major assumptions was that all trips leaving the Port of Oakland traveled on freeways through the community without accessing minor arterials or secondary roadways. The HRA report states:

"*This approach may understate the magnitude of emission from trucks serving the Port of Oakland, because port-truck operations within the community are not well characterized even through clearly some are occurring. Since drayage truck emissions were subtracted from the total emissions on the network, any potential underestimate in drayage truck emission in the Part I [Port] inventory implies an equal overestimate in Part III [non-Port and non-Union Pacific] inventories.*"

CARB, the Port of Oakland, and the District concurred that the emissions data used in the HRA was the best available information at the time, but noted that, as with any study, additional data may be collected to refine the risk assessment and reduce the uncertainties. The District designed this truck counting survey in consultation with CARB staff to improve the Port truck emissions estimates and overall traffic activity patterns in West Oakland. By conducting the West Oakland Truck Survey, the District was able to develop traffic volumes, idling activity, and truck age distributions representative of actual daytime activity levels. In addition, the survey was designed to help estimate the portion of truck emissions that are due to Port activity.

Overall, the District found many areas where the truck survey findings supported the HRA assumptions with respect to on-road trucks. The survey found reasonable agreement with the West Oakland HRA in the following ways:

- A majority of businesses are complying with the five minute idling regulation;
- Speed classifications for trucks on freeway was consistent with the HRA; and
- Truck age distribution from the survey was consistent with the Port's study near the terminals.

The survey also confirmed suspicions raised in the uncertainty section of the HRA that the overall trucking emissions were overestimated and the fraction of trucking emissions attributed to the Port of Oakland was underestimated. The survey results differed from the HRA with regard to the traffic volumes in the following ways:

- Fewer trucks in total on surface streets, but higher percent of Port trucks;
- Lower number of trucks on freeways I-980 and I-580; and
- Higher number of Port and non-Port trucks on freeway I-880.

Some of the discrepancies may be attributed to differences in survey methods and assumptions when identifying a truck as Port truck (see Section 5.3). However, methodological differences do not bridge the gap between the two study results. Given the comparisons with HRA assumptions, the District has adjusted the HRA findings to account for the West Oakland truck survey results.

To adjust the risk, the District estimated VMT for Port trucks and non-Port trucks driving on surface streets in West Oakland. For freeway emissions, the District used the direct counts that were recorded during the survey. The District developed ratios based on the differences in truck volumes on surface streets and freeways from the two studies and also considers survey findings relative to the contributions from Port versus non-Port trucks. The adjusted health risk showed a 13% increase in population weighted risk from Port trucks and a corresponding decrease of 14% in the population weighted risk attributed to non-Port and non-Union Pacific activities. Overall, the estimated risk from all trucking operations decreased from 844 cases in a million to 525 cases in a million. Port trucking operations also become the highest contributor to the overall risk from Port activities, responsible for about 41% of the cancer risk from Port operations. The District has critically evaluated these findings and considered potential decline in vessel calls and cargo shipments since the HRA was conducted. The District believes that the trucking operations data for West Oakland in the HRA was limited and likely underestimated the Port's contribution.

The revised health risk estimates indicate that continued emission reduction efforts are critically needed. Truck emissions are the single highest source of diesel emissions in West Oakland, while other sources, such as ships, are also important contributors. The District's initiatives to reduce emissions through incentives and grants should have a significant impact in improving the air quality in West Oakland by targeting grants at trucks, ships, and other sources impacting the community. Compliance with regulations adopted by CARB is an essential mitigation strategy. The District is working with CARB to help enforce CARB diesel regulations. The Port also has a significant role to play in reducing these emissions, and collaborative initiatives that can be established with Port tenants, CARB, and the District, will help with these efforts. The District also will continue to support outreach efforts to businesses to curb idling and support the efforts by Alameda County and the Port of Oakland to move truck services and offer long term parking on Port property.

The study findings show some progress has been made. Local businesses are complying with the idling regulation and older, higher polluting truck engines are being phased out. The Port has also adopted a resolution to ban trucks older than 1993 from entering terminals. All of these measures are steps in the right direction.

These recommendations alone will not achieve the emission reductions required to sufficiently improve health conditions in West Oakland. The District has initiated a Clean Air Communities Initiative program that encompasses a multi-pronged approach to improve air quality for impacted communities such as West Oakland. The program uses a variety of strategies including targeted regulations; focused grant and incentive funding; outreach and communication to community, businesses, and health departments; including air quality in critical land use decisions to protect current and future residents; monitoring local sources; and enforcement of CARB and District regulations. The District will continue to work on additional emission reduction strategies through this program to reduce the potential health risk associated with diesel emissions in West Oakland.

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Appendix A

Truck Survey Log Sheets

APPENDIX A

Appendix A presents the truck survey log sheets and idling questionnaire that were used during the manual counts. There are two versions of log sheets that were used depending on whether the counter, situated on the northwestern corner of an intersection, was observing trucks coming from north and east or the south and west. The north and east directions used log sheet version 1 while the south and west direction used version 2.

TRUCK-BASED BUSINESS SURVEY

Facility Name:______________________________

Facility Address:______________________________

Contact Person/Title:______________________________

Phone:_______________ E-mail:____________________

Facility Information: Business Type:____________________

Size (acres):____________ # Employees:__________

Number of loading docks:____________________

Facility Operations: Start Time:____________ End Time:____________

Days per week:__________ Weeks per year:__________

Please provide the information shown in the tables below for all diesel-powered trucks and equipment (such as forklifts and cargo handling equipment) operating at this facility. Truck activity should be reported according to the classifications shown on the back of this page. (Note: providing a range of values is acceptable if exact values are not known).

Diesel-powered truck information

Number of Axles	Number of Trucks per Day	Number that have TRUs*	Truck Age Range	Avg. Idle Time per Truck (min.)	Estimated On-site Distance Traveled	TRUs* On-Site Run Time (min.)
2						
3						
4						
5						
6+						

Note: TRU = transport refrigeration unit

Diesel-powered off-road equipment information (if applicable)

Equipment Type	Number of Equipment	HP	Engine Year	Days per week Operated	Avg. Hours per Day	Start Hour	Fuel Consumed (gal/day)	% Time at Idle	% Time Under Load

WEST OAKLAND
TRUCK SURVEY LOG SHEETS (1)

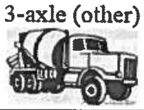
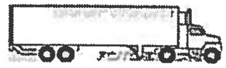
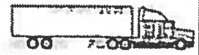
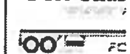
Location:______________________

Cross Street:______________________

(Label diagram with street names, your location, and direction of traffic flow) ⟶

SURVEY DATE (DD/MM/YEAR):______________________ **SURVEYOR:**______________________

DAY OF THE WEEK (circle one): Mon Tue Wed Thu Fri Sat **START TIME:**__________AM/PM **END TI**

Direction	2-axle 	3-axle (other) 	3-axle Bobtail 	4-axle 	5-axle 	6+ axles (tandem) 	Port Chas 

Location:________________________

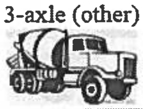
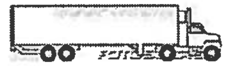
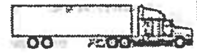
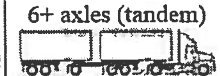
Cross Street:________________________

(Label diagram with street names, your location, and direction of traffic flow) ⟶

WEST OAKLAND
TRUCK SURVEY LOG SHEETS (2)

SURVEY DATE (DD/MM/YEAR):____________________ **SURVEYOR:**____________________

DAY OF THE WEEK (circle one): Mon Tue Wed Thu Fri Sat **START TIME:**__________**AM/PM** **END TI**

Direction		2-axle 	3-axle (other) 	3-axle Bobtail 	4-axle 	5-axle 	6+ axles (tandem) 	Port Chas 

Appendix B

Uncertainty Association with Automatic Counters

APPENDIX B

At four of the sites in West Oakland, both automatic and manual truck counts were performed (see Table B-1). Overall, the automatic truck counts at these sites were 1.2 to 15.3 times higher than the manual counts. Automatic truck counts were binned by the number of axles (e.g., 2-axle long, 2-axle/6 tire, 3-axle single, 4-axle single, etc.), and examination of the data showed that a significant number of trucks were being counted in the smallest "2-axle long" truck classification. Removal of this category from the automatic count totals brought the automatic truck counts and manual counts into much closer agreement, with the automatic counts being only 2% to 33% higher than the manual counts. This finding suggests that the automatic counters may have difficulty distinguishing between small 2-axle trucks and light-duty vehicles. The significance of the 2-axle long category varies for each site, depending on the mix of trucks counted at a given site. For example, at the 3rd and Adeline site, larger trucks (port trucks and other 3+-axle trucks) dominate the truck counts and removing the "2-axle long" category has a minor effect (see Figure B-1). However, non-port sites, such as the intersection of Mandela and West Grand, have a higher fraction of small truck (<3 axles) traffic. Therefore, removing the "2-axle long" category has a larger effect on this site than at a port site like 3rd and Adeline (see Figure B-2). Because of the uncertainty of the counts and truck classifications, the automatic counter data were only used to discern daily traffic patterns and vehicles speeds.

Table B-1. Summary of Truck Counts by Manual and Automatic Counters

Intersection	Beginning Hour	Ending Hour	Manual Totals	Automatic Totals	Modified Automatic Totals
3rd & Adeline – Sat.	8 AM	6 PM	56	249	44
3rd & Adeline – Wed.	8 AM	6 PM	2513	3264	2817
Mandela & West Grand	7 AM	6 PM	955	3119	1076
Market & 18th	8 AM	12 PM	104	423	106
30th & MLK	8 AM	12 PM	3	46	4

Figure B-1. Hourly truck counts near the intersection of 3rd and Adeline.

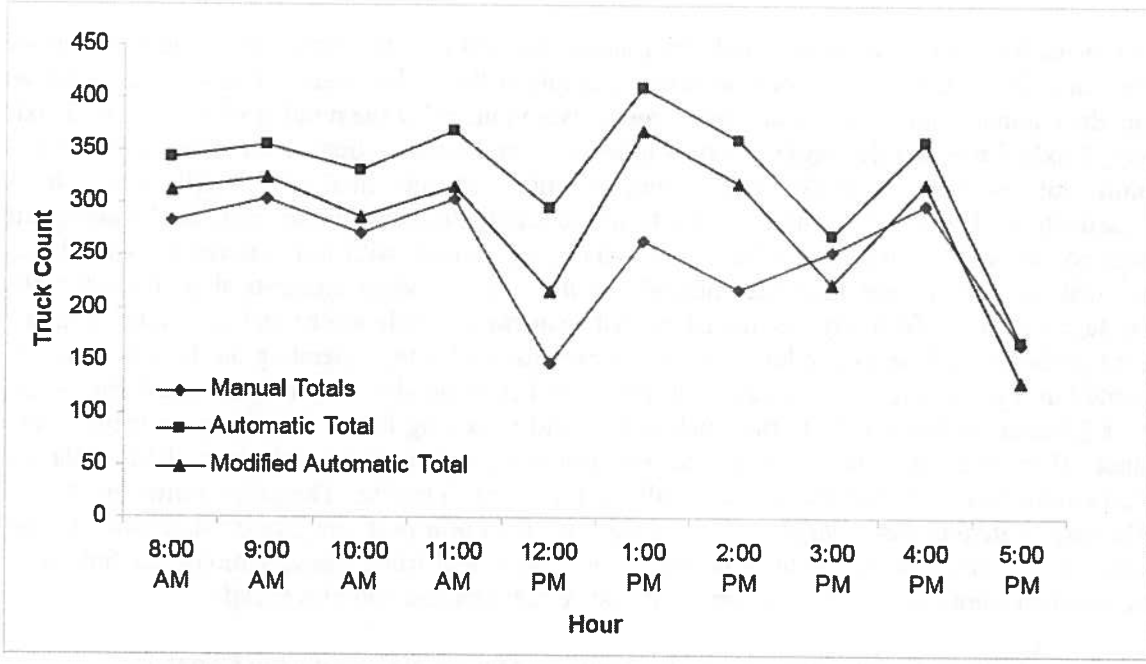
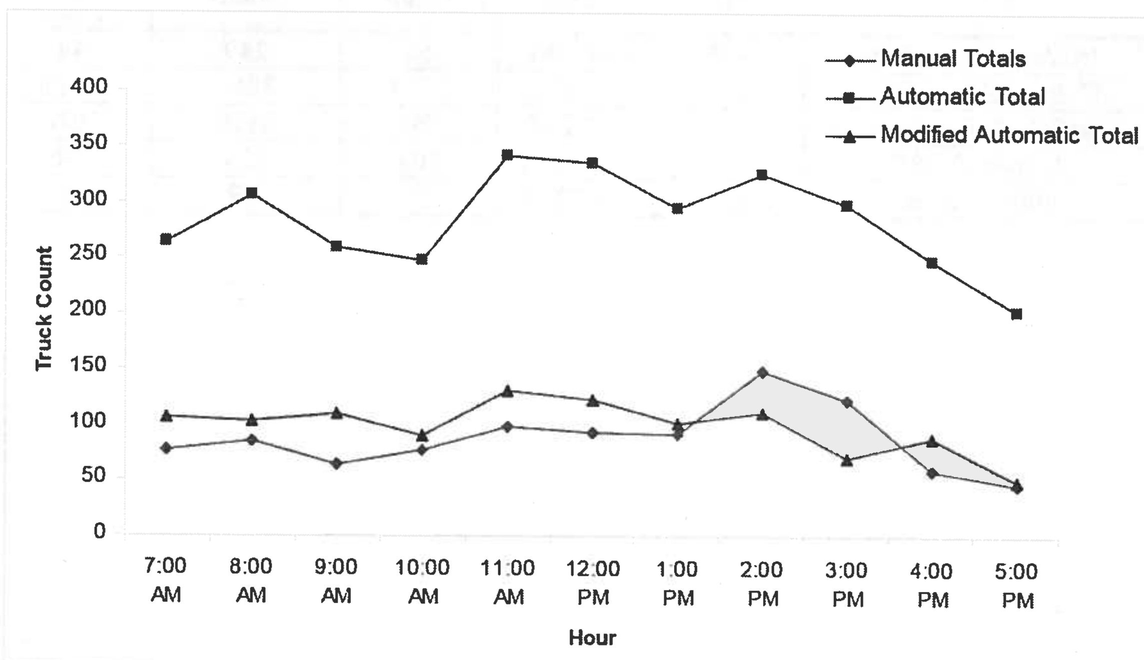


Figure B-2. Hourly truck counts near the intersection of Mandela and West Grand



Appendix C

Developing Truck Routes and Freeway Volumes

APPENDIX C

I. Traffic Volumes along Surface Streets

Truck volumes were estimated on surface streets of West Oakland by developing a roadway network of frequently used truck routes and then estimating the number of trucks that travel on each route. The District developed unique routes that trucks generally travel to and from the Port of Oakland. The truck routes were developed using the GPS tracking data collected from approximately 200 trucks that travel to and from the Port of Oakland (see Section 1.3) from 2006 through 2007. The GPS tracking units in the driver's cell phone were used to relay truck positions every two minutes; however, some of the transmissions were sporadic and intermittent. Because the cell phone needed to be operational and charged, transmissions ranged from less than 10 minutes to over a year.

In order to develop Port truck routes, the District developed a program that used the three previous or succeeding observations to deduce the likely route when trucks exited or entered the Port. For trucks to be positively identified as traveling along a certain route, three successive GPS readings must align along the route. The District also conducted a short study in 2007 to characterize routes of non-Port trucks. In that study, District staff followed an iterative process of randomly selecting trucks as they entered West Oakland and tracking them until they reached their final destination in West Oakland or merged onto the freeway. The District combined the routes from both studies to develop the 55 unique routes that make up the roadway network. Table C-1 presents a list and description of the routes and also shows the number of occasions that a truck may have traveled on the route ("any") and the number of times that a truck was positively identified as traveling along the route ("unique").

Table C-1. List of Possible Truck Routes

File name	GPS Counts		Description
	any*	Unique*	
Routes Into Southern Port Area			
sproute1.kml	2284	308	I-880 N, off on 7th St @ Market, turn on Adeline
sproute2.kml	1730	62	I-880 N, off on 7th St, turn on Market, then 3rd, then into Adeline Port entrance
sproute3.kml	425	62	7th Street into south Port via 7th and Frontage entrance
Sproute4.kml	860	143	I-80 south to 7th St off ramp, into Port
Sproute5.kml	1141	357	I-80 south, off on 5th St exit, turn on Adeline into Port
Sproute6.kml	1510	7	I-880 north, off at 7th & Frontage, into Port, into south Port @ Maritime
Sproute7.kml	751	25	Gas station @ 5th and Adeline, into Port @ Adeline
sproute8.kml	3592	1468	I-880 north, off at 7th, into Port, into south Port @ middle harbor
sproute9.kml	2129	807	I-80 south to 7th St off ramp, into Port via 7th St-Middle Road
sproute10.kml	877	61	Parking lot near W Grand, W Grand to Mandela, down Mandela to 7th, over to Adeline, into south Port.
sproute11.kml	2450	321	I-80, off at W. Grand Ave, into north Port @ Maritime, along Maritime, then 7th, into south Port at Middle Harbor
sproute12.kml			I-880, off at Broadway, turn on 3rd to Adeline into Port @ Adeline
sprouteh.kml	1113	479	Start at Howard terminal, go up to 3rd Street, over to Adeline

File name	GPS Counts		Description
	any*	Unique*	
sproutnp.kml	9362	6993	Any route from north port into south
sptf1.kml			W. Grand Ave, into north Port @ Maritime, down Maritime and into south Port.
			Routes Exiting Southern Port Area
Sprout1.kml	3539	1593	South Port, out Adeline, turn on 5th onto I-880 south
Sprout2.kml	1815	21	South Port, 7th St, onto I-880 south
Sprout3.kml	1593	717	South Port, out 7th, onto I-80 north
Sprout4.kml	1718	766	South Port, out Adeline to 5th, onto I-80 north
Sprout5np.kml	1964	126	South Port, out Adeline exit to 7th, left on 7th to north Port
Sprout6.kml	2501	251	South Port, into north Port on middle harbor, 7th St exit onto I-880 south
Sprout7np.kml	2007	126	South Port, out Adeline exit to 5th, onto I-880 N, off at 7th, into north Port
sprout8.kml	915	79	South Port into north port along Maritime. Maritime and W. Grand exit to frontage road then I-80 north
Sprout9h.kml	653	50	South Port, out and along 7th St to Market, south into Howard Terminal
sprouth.kml	949	280	South Port, Adeline, 3rd, into Howard Terminal
sproutnp.kml	10390	389	South Port into north Port
sproutf3.kml			Along Embarcadero to Market to 3rd, into Port @ Adeline
Spoutf1.kml			Out Adeline to 7th, to Mandela, to W Grand, to Union. St. on Union.
Spoutf2.kml			To 3rd to Broadway, to 5th & Broadway I-880 south
			Routes Into Northern Port Area
Nprout7np.kml	1648	111	North of Port, out Maritime exit to W. Grand, onto Frontage road, back into north Port @ 7th
nproute1.kml	3182	1753	I-80, off at W. Grand Ave, into Port @ Maritime
nproute11.kml	7305	414	I-880 N, off at W Grand, into north Port @ Maritime
nproute2.kml	922	217	From Bay Bridge, into Port @ Maritime
nproute3.kml	7622	851	I-880 north, off at 7th and Frontage, into Port
nproute3h.kml	1266	46	Howard, turn on 3rd, Adeline to 7th, into north Port @ 7th and Frontage
nproute4.kml	1162	36	Along 7th Street into Port via 7th and Frontage entrance
nproute4h.kml	1986	108	Howard, turn on 3rd, Adeline to 5th, onto I-880 north, into north Port @ 7th and Frontage
nproute5.kml	720	30	W. Grand Ave into Port @ Maritime
nproute5h.kml	2449	129	Howard, Market, turn on 5th, onto I-880, off at 7th and Frontage, into Port
nproute6.kml	2456	218	I-80 to Frontage Road and W Grand, then into Port
nproute6h.kml	1365	135	Howard, turn on 3rd, turn on Adeline into south Port, along Maritime to north Port.
nproute7.kml	4142	1641	I-80 south to 7th St off ramp, into north Port
nproute8.kml	1595	86	South Port, out Adeline, onto I-880 north, off at 7th, into north Port.
nproute9.kml	696	8	Adeline to W Grand, then into north Port @ Maritime
nprouteh.kml	1337	74	Howard, Market, left on 7th, into north Port
nproutnp.kml	2331	960	Hypothetic route along northern area of the Port
nproutsp.kml	12017	10836	South Port into north Port
			Routes into Howard Terminal
hroute1.kml	520	208	From I-880 N, off at 7th and Market, down Market into Howard
hroute2.kml	738	253	I-880 south, off on 5th, turn on Market to Howard Terminal.
hroute4.kml	665	102	I-880 south, off on 5th, turn on Adeline then 3rd then Market to Howard Terminal.
hroute5.kml	568	83	I-80 south, onto I-880, off at 5th, Adeline, 3rd, Market, into Howard

File name	GPS Counts		Description
	any*	Unique*	
hroute7np.kml	566	107	North Port, out 7th and along 7th, turn on Market, into Howard
hroute8.kml	477	54	I-80s, off at W. Grand, to Mandela, to 7th, over to Market, to Howard
hroutesp.kml	644	176	Route to Howard terminal from south Port, via 3rd St
hroutenp	657	402	North Port, out 7th, onto i-880 south, off at 5th, Adeline, 3rd, Market, into Howard

* **Unique** means those instances where that route was the only route the truck could have been on. **Any** means that the truck might have been on that route, but could also have been on others.

The roadway network and the GPS transmissions alone are not sufficient to estimate the total truck volumes on each route. Instead, the District used the manual counts to estimate the number of trucks that travel daily on each route. The manual counts indicate the actual number of trucks at each intersection correlated by the time of day and day of the week. A statistical program was written to approximate traffic density on each street route to closely match the survey results at each intersection.

II. Freeway Volumes

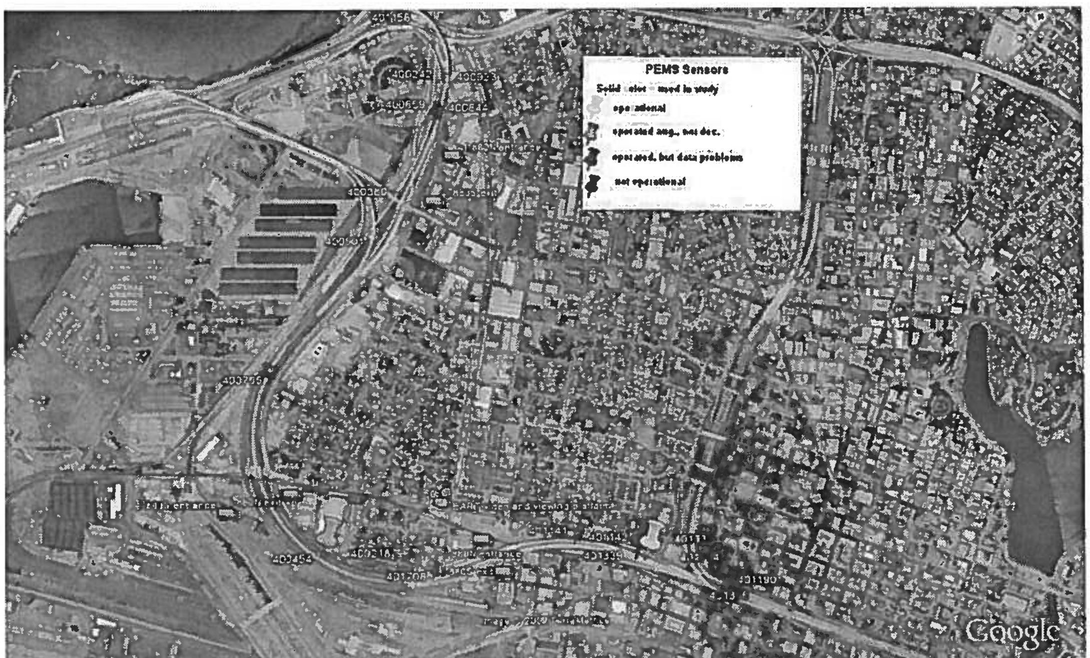
West Oakland contains portions of four major freeways including I-580, I-980, I-880, and I-80 and the eastern span of the Bay Bridge. The District conducted manual counts on I-580, I-980, and I-880. For I-580, half a day counts were performed and found minimal Port truck activity. For I-980, a full day of counting was conducted and only marginally more Port trucks were counted as compared to I-580. On both freeways, Port trucks represented one to two percent of the truck traffic. Additional data analysis was not performed on these two freeways since many of the PeMS sensors along these routes were in operable at the time of the survey.

The District estimated the number of trucks traveling on the most heavily used freeway, I-880, which is directly upwind of West Oakland and nearest to Port activity. For the freeway estimate, the District only included trucks traveling on I-880 that did not enter or exit into West Oakland. The District used three data sources for this estimate including the PeMS data (2008), which are automatic measurements of all traffic made at various points on I-880; manual counts made of trucks on the freeway and on freeway entrances and exits; and video footage of I-880 taken from the West Oakland BART platform.

The PeMS network (see Figure C-1) includes all major freeways in the Bay Area; however, a majority of the sensors along the I-880 corridor in West Oakland are nonfunctioning or inaccurate. When functioning, the PeMS processes 30-second loop detector data from freeway segments across California. Figure C-1 shows the locations and conditions of the PeMS sensors along I-880. For estimating northbound I-880 traffic, the District used data from sensors 401333 and 400218. The readings from these sensors were verified as accurate through comparisons to video footage collected from the West Oakland BART platform on December 8 and 10, 2008.

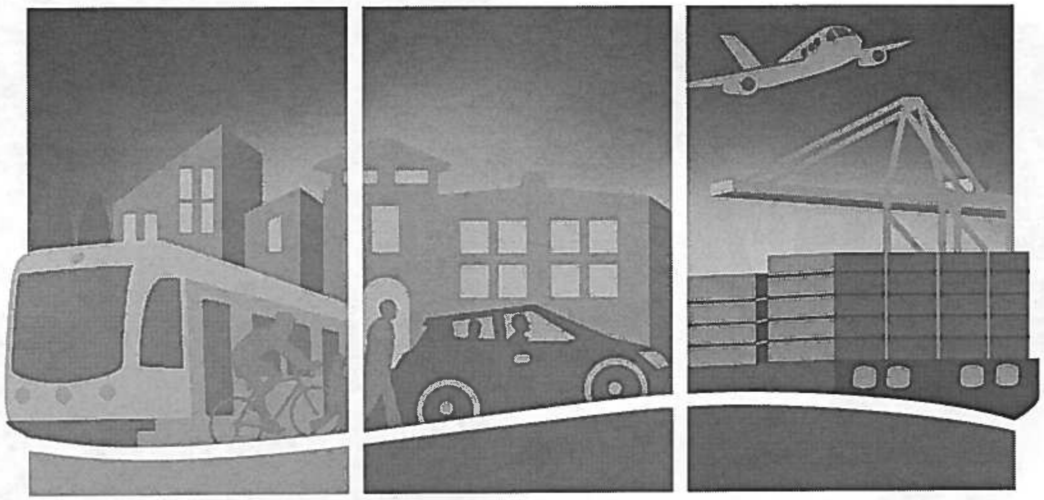
Sensor 401333 includes trucks that enter from 5th and Union on-ramp or exit off of 7th and Frontage. Manual counts were conducted on the 5th and Union Street intersection on December 8 and 9, 2008. The counts from these two days were averaged and then subtracted from the total sensor reading from 401333. The other sensor, 400218, located just north of 7th and Frontage exit was used to adjust the reading from sensor 401333 to account for the loss of trucks exiting to the Port. Sensor 400218 ceased operations in August 2008 and thus, readings collected in August were assumed to be consistent with December.

Figure C-1. Status of PeMS Network and Usable Sensors Data



Note: Pin cushion locations of PeMS sensor location, truck on ramp and exits are shown with blue trucks, movie camera represents location where video footage was collected.

For southbound I-880, a similar methodology was used based on readings from sensor 401339, located south of the 5th and Union Street exit, but also south of 7th and Frontage on-ramp. In comparison to the video footage, the lane sensors on 2 and 3 were accurate except for the sensor on lane 4 where the readings were incorrect. The District had to approximate the traffic on lane 4 by comparing the up freeway sensor 400454 to sensor 401339. By comparing traffic from lanes 2 through 4 from sensor 400454 to readings from lanes 2 and 3 from sensor 401339, the District was able to estimate lane 4 traffic. The traffic count from sensor 401339 was further adjusted by accounting for trucks entering I-880 from 7th and Frontage Street on-ramp. Based on the manual counts, approximately a quarter of the trucks on I-880 entered from this ramp.



REGIONAL TRANSPORTATION PLAN 2012–2035 RTP

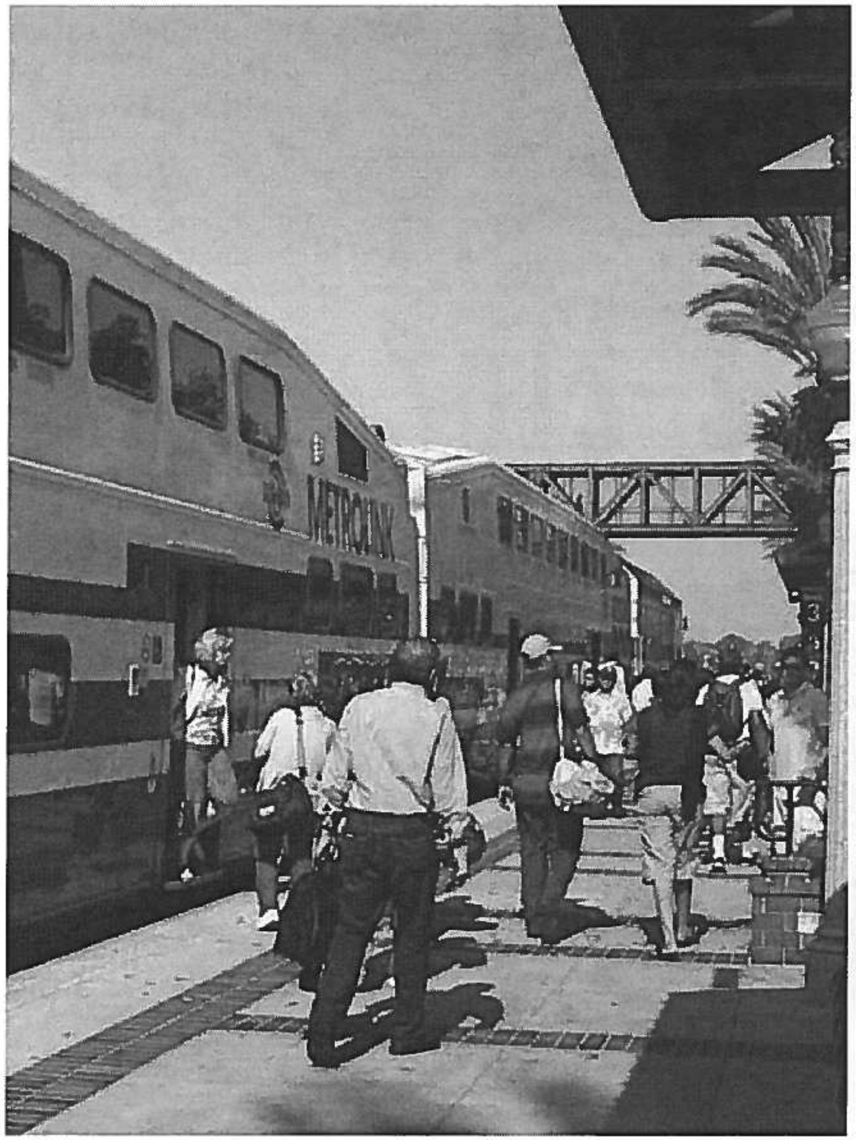
SUSTAINABLE COMMUNITIES STRATEGY

Towards a Sustainable Future

Thank you for using the Download/Print Dashboard for the 2012-2035 RTP/SCS by The Southern California Association of Goverments. In this document are PDFs of the Final 2012-2035 RTP/SCS.

SOUTHERN CALIFORNIA
ASSOCIATION of GOVERNMENTS

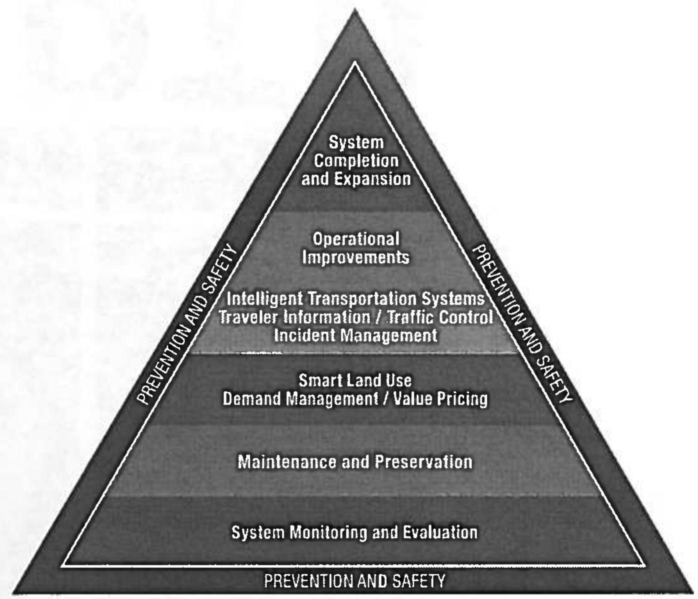
02 TRANSPORTATION INVESTMENTS



Introduction

SCAG has consistently advocated a system management approach that aims to protect, maximize the productivity of, and strategically expand our region's transportation system. This approach recognizes that we can no longer afford to rely on system expansion alone to address our mobility needs. Rather, an integrated approach is needed, based upon comprehensive system monitoring and evaluation and the use of performance measures to ensure that the best-performing projects and strategies are included in the RTP/SCS. This approach is depicted as the mobility pyramid shown in **FIGURE 2.1.**

FIGURE 2.1 Mobility Pyramid



Over the course of developing the plan, we have heard from our stakeholders that we need to make sure we are investing our scarce transportation dollars more efficiently and effectively before we expect our taxpayers to pay more. Making sure that every dollar available is spent wisely is at the heart of this philosophy. At the bottom of this pyramid is System Monitoring and Evaluation. In order to be effective system managers, we must have an in-depth understanding of how our system performs and why it performs the way it does. Only by understanding these causes can we identify the optimal mix of strategies and projects that yield the highest returns on our investments. Next, we must take care of what we have and make sure that what we have is performing at the most efficient level possible. So, the basic idea as you move up the "mobility pyramid" is to implement less capital intensive strategies or less invasive strategies before we consider implementing more drastic measures to deal with our challenges. At the same time, we must be realistic about our ability to address our challenges with "soft solutions" alone in the face of the tremendous growth that we anticipate over the next 25 years. Therefore, at the top of the pyramid are the capital improvement projects that will allow us to expand our system strategically to accommodate such future growth and maintain and improve our economic prosperity.

Following the system management philosophy, this chapter sets forth the investments and strategies that constitute the 2012–2035 RTP/SCS. First, transportation investments should seek to optimize the performance of the existing system, and this includes system maintenance and preservation, integrated land use, operational improvements, transportation demand management, and transportation systems management strategies. Second, investments should seek to complete the system by addressing gaps. Finally, our investments should expand the system strategically. As a result, Southern Californians will enjoy more and better travel choices via an efficient multimodal transportation system with improved access to the vast opportunities this region has to offer.

Getting the Most Out of Our System

Over the past half century, the SCAG region has invested billions of dollars into building and expanding the multimodal transportation system that we have and rely on today. This investment must be protected. Under the system management approach, priority should be given to maintaining and preserving this system, as well as ensuring that it is being operated as safely, efficiently, and effectively as possible. Protecting our previous investments in developing the region's transportation system and getting the most out of every one of its components is the highest priority for this RTP/SCS.

Safety and Security First

SCAG recognizes how important the safety and security of our transportation system is to our residents. The good news is we have made significant progress in improving safety, particularly highway safety, which accounts for the majority of transportation-related accidents, around the state and in our region. But, we can do more. SCAG continues to support the implementation of the State Highway Safety Plan (SHSP) and works in partnership with Caltrans and the CTCs around the region to improve the safety and security of our transportation system.

Safety improvements are intricately woven into the RTP/SCS at all levels. Many of the strategy and investment categories in this RTP/SCS aim to improve the safety of our multimodal transportation system. For instance, enhancing maintenance and preservation of the region's buses, rail track, bridges, and roadway pavements will contribute toward reduced accidents and improved safety. Similarly, expanding the network of bike lanes and sidewalks and bringing them into ADA (American with Disabilities Act) compliance will reduce accidents directly related to these modes. Furthermore, deploying technology such as advanced ramp metering to manage traffic flow also reduces collisions at on-ramps and critical freeway-to-freeway interchanges. In short, almost every category of investments discussed in this chapter leads to safety benefits.

SCAG has two main safety and security goals:

- Ensure transportation safety, security, and reliability for all people and goods in the region.
- Prevent, protect, respond to, and recover from major human-caused or natural events in order to minimize the threat and impact to lives, property, the transportation network, and the regional economy.

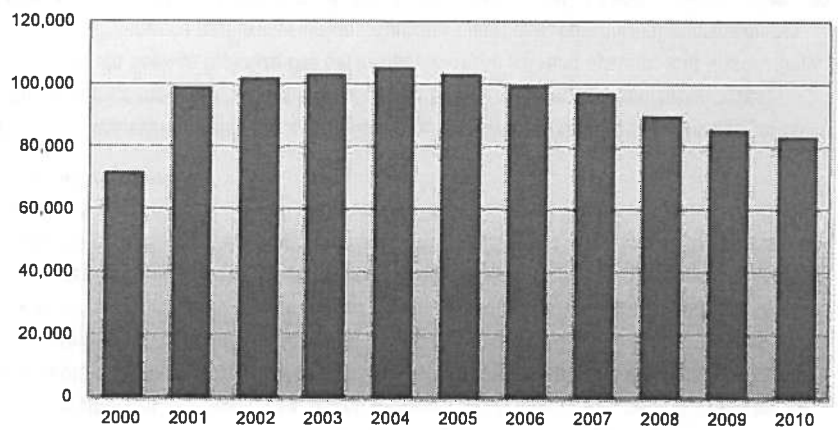
SAFETY

The rate of fatal and injury collisions on California's highways has declined dramatically since the California Highway Patrol began keeping such data in the 1930s. California has led the nation in roadway safety for much of the past 20 years. Only recently have roadways nationally become as safe as those in California. **FIGURE 2.2** shows the improvement in roadway accidents in the SCAG region over the last 10 years.

While the trend indicates a long-term decline in fatalities compared to VMT, it remains an unacceptable personal burden to those involved. In 2008, over 1,500 people died on roadways in the SCAG region, and just under 125,000 were injured. The average costs for each traffic death, traffic injury, or 2012–2035 RTP property damage crash were (in 2005):

- Death – $1,150,000
- Nonfatal Disabling Injury – $52,900
- Property Damage, Including Non-Disabling Injuries – $7,500

FIGURE 2.2 Annual Collisions on the State Highway System in the SCAG Region



SAFETEA-LU required states to develop Strategic Highway Safety Plans (SHSPs). The California Department of Transportation (Caltrans) responded by developing its SHSP through a participatory process with over 300 stakeholders throughout California. The overarching goal was to reduce the California roadway fatality rate to less than 1.0 fatality per 100 million vehicle miles traveled (VMT) by 2010. The efforts culminated with 17 challenge areas and over 150 actions designed to reduce fatalities in each challenge area. The state achieved its goal in 2009 and is now focusing on reducing transportation fatalities further with a new SHSP in development.

SECURITY

Currently, there are numerous agencies that participate in the response to incidents and assist with hazard preparedness for individual jurisdictions. Collaboration occurs between many of these agencies. The Federal Emergency Management Agency (FEMA) oversees coordination. However, FEMA defines metropolitan areas and coordination differently than the U.S. Department of Transportation, limiting SCAG's ability to participate at an agency level. SCAG seeks to utilize its strengths and organization to assist planners, first responders, and recovery teams in a supporting role.

There are three areas in which SCAG can assist both before a major emergency and during the recovery period:

- Provide a policy forum to help develop regional consensus and education on security policies and emergency responses
- Assist in expediting the planning and programming of transportation infrastructure repairs from major disasters
- Encourage integration of transportation security measures into transportation projects early in the project development process by leveraging SCAG's relevant plans, programs, and processes, including regional ITS architecture

Beginning in 2008, SCAG participated in the development of the draft Southern California Catastrophic Earthquake Preparedness Plan. The Plan was based on the 2007 Operation Golden Guardian scenario, which SCAG also assisted in developing, and envisioned a 7.8 earthquake starting in the Salton Sea area and traveling across the SCAG region to the Grapevine area where I-5 meets SR-138.

The Plan examines the initial impacts, inventory of resources, and care for the wounded and homeless, and it developed a long-term recovery process. The process of Long-Term Regional Recovery (LTRR) provides a mechanism for coordinating federal support to state, tribal, regional, and local governments, nongovernmental organizations (NGOs), and the private sector to enable recovery from the long-term consequences of extraordinary disasters. The LTRR process accomplishes this by identifying and facilitating availability and use of sources of recovery funding and providing technical assistance (such as impact analyses) for recovery and recovery planning support. "Long-Term Regional Recovery" refers to the need to reestablish a healthy, functioning region that will sustain itself over time. Long-term recovery is NOT debris removal and restoration of utilities, which are considered immediate or short-term recovery actions.

Once a disaster has been proclaimed, the LTRR process may be activated for incidents that require a coordinated federal, state, tribal, regional, and local government response to address significant long-term impacts (e.g., impacts on housing, government operations, agriculture, businesses, employment, regional infrastructure, the environment, human health, and social services) to foster sustainable recovery. The three main focus areas of LTRR are:

- Housing,
- Infrastructure, and
- Economic Development.

When a disaster occurs, the initial operational focus is centered on response activities. This effort may last from a few hours to an extended period of time (several days or longer) depending on the situation. As response activities begin to taper off and non-life-threatening safety issues begin to be addressed, the operational focus begins to shift from response to recovery. Federal and state support will be heaviest during the beginning phase of the recovery effort when:

- Long-term impact analyses are performed,
- Necessary technical support to establish local long-term recovery strategies and/or plans is provided, and
- Coordination of long-term recovery resources needed by the region to launch its recovery efforts are complete.

Federal and state support lessens by the later stages of the LTRR process once the region has sufficient capacity to implement its long-term recovery plan.

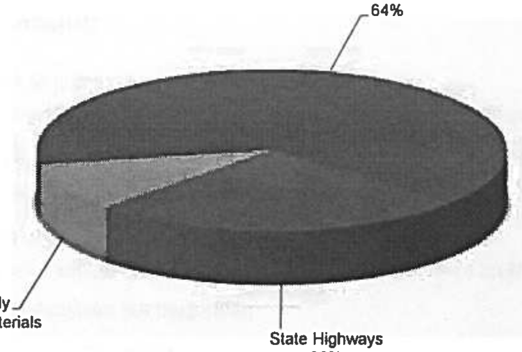
System Preservation

Recognizing that deferring the maintenance of our transportation system will only result in much costlier repairs in the future, preserving our assets now is a critical priority of this RTP/SCS. Approximately $217 billion, or almost half of all of its proposed expenditures through 2035, is allocated to system preservation and maintenance. As indicated in Chapter 1, to a great extent, this high cost is a result of three decades of preservation

underinvestment. Deficient road conditions are all too familiar to the region's drivers, and without a renewed commitment to improving the condition of our transportation infrastructure, costs will increase even more dramatically. Therefore, SCAG will continue to work with its stakeholders, particularly county transportation commissions and Caltrans, to identify new funding sources and/or increased funding levels for preservation and maintenance.

FIGURE 2.3 presents the allocation of these expenditures among the transit system, the state highway system, and arterials of regional significance within the 2012–2035 RTP/SCS. Note that the allocation for the state highway system includes bridges and the allocation for transit includes funding to both preserve and operate the transit system.

FIGURE 2.3 Preservation and Operations Funding



Smart Land Use

Since initiating one of the nation's first large-scale regional growth visioning efforts in 2000, SCAG has sought to integrate land use and transportation by working with subregions and local communities to increase development densities and improve the jobs/housing balance. Implementing such smart land use strategies encourages walking, biking, and transit use, and therefore reduces vehicular demand. This saves travel time, reduces pollution, and leads to improved health. The SCS (in Chapter 4) describes the successes of the previous smart land use efforts in the region and lays the foundation for significant further improvements moving forward.

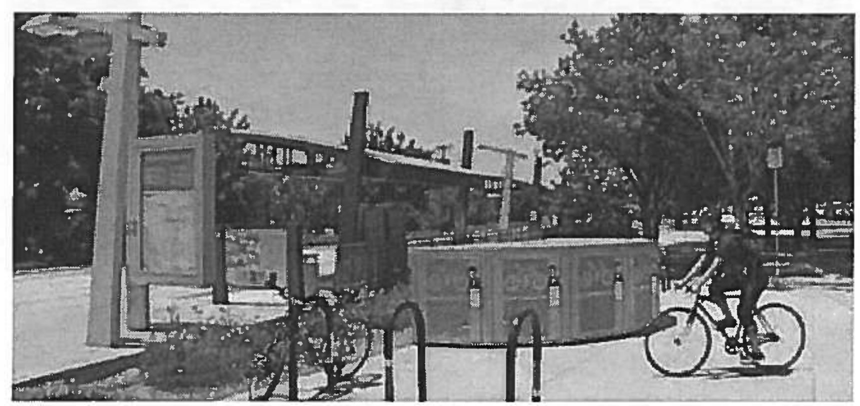
Transportation Demand Management

Transportation demand management (TDM) strategies reduce vehicular demand and thereby congestion, particularly during peak periods. Successful TDM combines two complementary strategies: "soft," or "pull," strategies—such as vanpool subsidies and preferential parking for carpools, with "hard," or "push," strategies—such as congestion pricing.

The first encourages or incentivizes travelers to reduce automobile use by making alternatives more desirable. The second discourages travelers from using automobiles by increasing out-of-pocket travel costs.

The RTP/SCS financial plan (Chapter 3) identifies reasonably available revenue sources that provide much-needed funding for infrastructure preservation and critical regional projects. Increasing driving costs over the RTP/SCS timeframe will also encourage some to look for more cost-effective travel options. In total, the RTP/SCS allocates $4.5 billion to TDM strategies to target such drivers and others and incentivize them in three ways:

- Increase carpooling and vanpooling.
  Carpooling is supported by a host of strategies. High-occupancy vehicle (HOV) lanes and convenient park-and-ride lots increase carpool usage. Other strategies include vanpool services for larger employers and rideshare matching services. Los Angeles, Orange, Riverside, and San Bernardino Counties jointly sponsor a regional "Guaranteed Ride Home Program," which provides transportation for carpoolers and transit users in emergency situations.
- Increase the use of transit, bicycling, and walking.
  The RTP/SCS extends the reach of transit by focusing on "first mile/last mile" solutions. One of the biggest challenges in attracting new riders to transit is providing a reasonable and practical means of accessing transit at the origin and destination. "First mile/last mile" strategies are TDM strategies that offer reasonable and practical solutions to this problem, resulting in higher ridership for our transit services. Specific "first mile/



last mile" strategies include development of mobility hubs around major transit stations to provide easier access to destinations. Other strategies include integrating bicycling and transit through folding bikes on buses programs, triple racks on buses, and dedicated racks on light and heavy rail vehicles. A study by the Los Angeles County Metropolitan Authority (Metro) indicates that 1.3 percent of all annual Metro Rail riders access transit stations via bicycle. The percentage of bicyclists accessing transit is expected to increase as investments are made.

The RTP/SCS commits $6.7 billion to active transportation, which will expand bikeways, improve local streets, and address ADA requirements. Additional strategies include traffic calming and Complete Streets strategies, particularly near transit stations and schools, so as to further reduce vehicle trips by improving safety and desirability of active transportation.

- Redistribute vehicle trips from peak demand periods to non-peak periods by shifting work times/days/locations.

  The TDM investments also aim to reduce peak-hour congestion by promoting flexible work schedules and telecommuting, where applicable. Flexible work schedules allow employees to work fewer days in exchange for longer hours on the days they do work. For example, many employers offer a 9/80 schedule, where employees work 9 hours each day and have one extra day off every two weeks.

Telecommuting has increased dramatically over the past decade. Nearly 2.6 percent of all workers in the SCAG region telecommute most of the time, and an even greater number telecommute at least one day per month. Strategic investments put forth by the private sector that would remove barriers associated with telecommuting are expected to increase the number of full-time (equivalent) telecommuters to 5 percent in 2020 and 10 percent in 2035.

Congestion Management Process

The federal requirement for a Congestion Management Process (CMP) was initially enacted in the Intermodal Surface Transportation Efficiency Act (ISTEA) of 1991 and continued in the Transportation Equity Act for the 21st Century (TEA-21) in 1998 and subsequently in SAFETEA-LU. CMP requires monitoring, performance measures, and, in certain cases, mitigation measures. Above all, CMP requires and ensures that highway capacity projects that significantly increase the capacity for single-occupancy vehicles (SOV) be developed in a comprehensive context that considers all possible alternatives, including transit, TDM, and TSM strategies. Furthermore, if alternative strategies are demonstrably neither practical nor feasible, appropriate mitigation strategies must be considered in conjunction with significant roadway capacity improvement projects that would increase SOV capacity.

Each county transportation commission (CTC) in the SCAG region, with the exception of Imperial County, is also designated a Congestion Management Agency (CMA) and is required to develop Congestion Management Plans (CMPs) pursuant to California Government Code Section 65089 and update it every two years. Imperial County, the least-populated county in the region, has not reached the population threshold that would require them to opt in or out of the state CMP process at present. Nevertheless, Imperial County has embraced the spirit of CMP and is actively seeking to incorporate its key elements into their next long-range transportation plan update. So, effectively, SCAG's CMP is comprised of the CMPs developed by each of the CTCs integrated into the RTP/SCS and FTIP process as a unified response to reducing congestion in our region.

SCAG is proposing two critical improvements to our current CMP process, partly in response to the federal certification review that was concluded in the spring of 2010. First, SCAG will incorporate a requirement into the FTIP Guidelines that calls for submittal of documentation by the sponsoring agencies associated with significant roadway capacity projects (greater than $50 million) to ensure documentation of all the alternatives considered in defining the project as well as identifying appropriate mitigations that would be implemented in conjunction with the project.

Second, this RTP/SCS recognizes the importance of addressing non-recurring congestion (collisions, stalled cars, severe weather). Non-recurring congestion accounts for almost 50 percent of all congestion on our roadway system. So, for the first time, this RTP/SCS identifies non-recurring congestion delay on the state highway system, both for general purpose lanes and carpool lanes, as a key performance metric that will be monitored and reported over time to ensure we are making progress toward addressing this critical issue.

A more complete discussion of our regional CMP is provided in a separate technical report.

Transportation Systems Management

Transportation systems management (TSM) increases the productivity of the existing multimodal transportation system, thereby reducing the need for costly system expansion. TSM relies in part on intelligent transportation system (ITS) technologies to increase traffic flow and reduce congestion. This RTP/SCS dedicates up to $7.6 billion to TSM. Examples of TSM categories and their associated benefits are described in **TABLE 2.1**.

TABLE 2.1 TSM Categories and Benefits

Category	Benefit
Enhanced Incident Management	Reduces Incident-related congestion which is estimated to represent half of the total congestion in urban areas
Advanced Ramp Metering	Alleviates congestion and reduces accidents at on-ramps and freeway-to-freeway interchanges
Traffic Signal Synchronization	Minimizes wait times at traffic signals and therefore reduces travel time
Advanced Traveler Information	Provides real-time traffic conditions, alternative routing, and transportation choices to the public
Improved Data Collection	Allows agencies to monitor system performance and optimize the impact of transportation investments
Universal Transit Fare Cards (Smart Cards)	Reduces time required to purchase transit tickets and allows interoperability among transit providers
Transit Automatic Vehicle Location (AVL)	Enables monitoring of transit vehicles and ensures on-time performance

TSM will also play an increasingly larger role in regional goods movement improvements. The Ports of Los Angeles and Long Beach have identified ITS technologies, specifically automated vehicle location (AVL), as a major component in their proposed air quality mitigation strategies. Advanced monitoring will assist in achieving system efficiencies in ports and intermodal operations, reducing delays and wait times at gates and destinations, and allowing for more flexible dispatching, all of which reduce emissions. Weigh-in motion systems and enhanced detection will allow for better enforcement of commercial vehicles rules, reducing pavement damage, and identifying critical paths for goods movement planning in the future.

Corridor System Management Plans

With the passage of Proposition 1B by California voters in November 2006, a program of funding called the Corridor Mobility Improvement Account (CMIA) was created to improve mobility on the state highway system. The California Transportation Commission adopted guidelines for the CMIA program that required the development of Corridor System Management Plans (CSMPs) for those projects receiving CMIA funding to ensure that mobility improvements would be maintained over time. In the SCAG region, CSMPs were developed by Caltrans for the following corridors:

- I-5 and I-405 in Los Angeles County;
- SR-57, SR-91, and SR-22/I-405/I-605 in Orange County;
- SR-91 and I-215 in Riverside County;
- I-10 and I-215 in San Bernardino County; and
- US-101 in Ventura County.

The CSMPs include several key components: a comprehensive corridor description and understanding; a performance assessment and bottleneck identification; identification of operational and minor infrastructure improvements to relieve congestion; and development of simulation models to estimate improvements from those projects and strategies. The recommended improvements include TSM investments such as ramp metering and enhanced incident management. The recommendations also include small infrastructure improvements such as auxiliary lanes and ramp and interchange improvements. The RTP/SCS includes $840 million of funding for the CSMP-recommended improvements.

Completing Our System

Southern California's highways and arterials extend for almost 22,000 center-line miles and 67,000 lane-miles and serve 62 million travelers each weekday. However, there are still critical gaps in the network that hinder access to certain parts of the region. Closing these gaps to complete the system will allow our residents to enjoy improved access to opportunities such as jobs, education, healthcare, and recreation.

Highways and Local Arterials

The expansion of highways and local arterials has slowed down over the last decade. This has occurred in part due to increasing costs and environmental concerns. However, there are still critical gaps and congestion chokepoints in the network that hinder access to certain parts of the region. Locally developed county transportation plans have identified projects to close these gaps, eliminate congestion chokepoints and complete the system. They are included in the RTP/SCS. **TABLE 2.2** highlights some of these highway completion projects. The full list of RTP/SCS projects is provided in the Project List Appendix.

TABLE 2.2 Major Highway Completion Projects

County	Project	Completion Year*
Imperial	SR-115 Expressway	2030
Los Angeles	SR-710 North Extension (tunnel) (alignment TBD)	2030
Los Angeles, San Bernardino	High Desert Corridor	2020
Orange	SR-241 Improvements	2030
Riverside	SR-79 Realignment and I-215 Improvements	2018
Ventura	US-101 and SR-118 Improvements	2018

* Represents the Plan network year for which the project was analyzed for the RTP/SCS modeling and regional emissions analysis

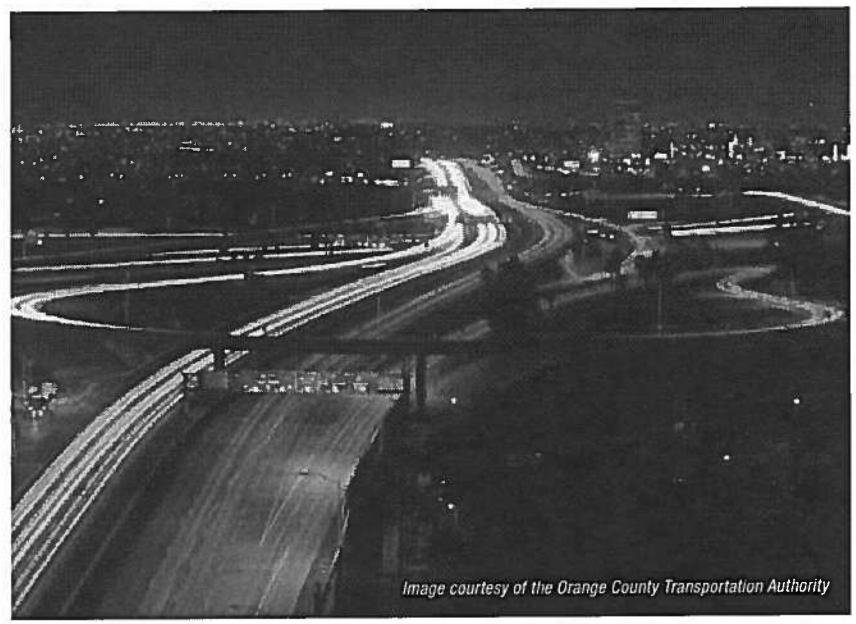


Image courtesy of the Orange County Transportation Authority

Image courtesy of Metro © 2012 LACMTA

Southern California's heavy investment in high-occupancy vehicle (HOV) lanes has given it one of the nation's most comprehensive HOV networks and highest rideshare rates. The Plan proposes strategic HOV gap closures and freeway-to-freeway direct HOV connectors to complete the system. The HOV lane network will serve as the backbone of the regional HOT lane system proposed in the "HOT Lanes Network" section later in this chapter. Another key HOV strategy in the Plan is the conversion of certain HOV lanes in the region to allow for continuous access. Orange County has taken a leadership role on this over the past few years, and their recent studies have concluded that continuous-access HOV lanes do not perform any worse than limited-access HOV lanes. At the same time, they provide carpoolers with greater freedom of movement in and out of HOV lanes. As a result, nearly every HOV lane in Orange County will be converted to allow for continuous access by the year 2013. **TABLE 2.3** highlights some of the Plan's major HOV projects and **EXHIBIT 2.1** provides a glance of major highway improvements proposed by the Plan.

TABLE 2.3 Major HOV Projects

County	Route	From	To	Completion Year*
HOV Lane Additions				
Los Angeles	I-10	I-605	Puente Ave	2014
Los Angeles	I-10	Puente Ave	SR-57/I-210	2018
Los Angeles	I-5	LA/OC County Line	I-605	2018
Los Angeles	I-5	Pico Canyon	Parker Rd	2030
Los Angeles	I-405	I-10	US-101	2018
Los Angeles	SR-14	Ave P-8	Ave L	2030
Orange	I-5	Avenida Pico	San Juan Creek Rd	2018
Orange	I-5	SR-55	SR-57	2018
Orange	SR-73	I-405	MacArthur	2035
Riverside	I-215	Riv/SB County Line	Spruce St	2014
Riverside	I-215	Nuevo Rd	Box Springs Rd	2030
Riverside	SR-91	Adams St	SR-60/I-215	2018
Riverside	I-15	Riv/SB County Line	I-15/I-215	2020
San Bernardino	I-10	Haven Ave	Ford St	2020
San Bernardino	I-10	Ford St	Riv/SB County Line	2030
San Bernardino	I-215	Orange Show Rd	Riv/SB County Line	2014
San Bernardino	I-215	SR-210	I-15	2030
San Bernardino	I-15	Riv/SB County Line	SR-18/Mojave River	2020
Freeway-to-Freeway HOV Connectors				
Los Angeles	I-5/SR-14	Connector		2014
Los Angeles	I-5/I-405	Connector (partial)		2030
Orange	I-405/SR-73	Connector		2035

* Represents the Plan network year for which the project was analyzed for the RTP/SCS modeling and regional emissions analysis

Our region's local streets and roads account for over 80 percent of the total road network and carry almost 50 percent of total traffic. They serve different purposes in different parts of the region, or even in different parts of the same city. Many streets serve as major thoroughfares or even alternate parallel routes to congested freeways. At the same time, within our urban areas, where a street right-of-way can account for as much as 40 percent of the total land area, streets shape the neighborhoods they pass through and often support different modes of transportation besides the automobile, including bicycles, pedestrians, and transit. The RTP/SCS contains a host of arterial projects and improvements to achieve different purposes in different areas. In all parts of the region, it includes operational and technological improvements to maximize system productivity in a more cost-effective way than simply adding capacity. Such strategic improvements include spot widening, signal prioritization, driveway consolidation and relocation, and grade separations at high-volume intersections. Finally, in a quickly growing number of areas, street improvement projects include new bicycle lanes and otdher design features such as lighting, landscaping, and modified roadway, parking, and sidewalk widths that work in concert to achieve both functional mobility for multiple modes of transportation and a great sense of place.

TABLE 2.4 Arterial Investment Summary (in Nominal Dollars, Billions)

County	Investment
Imperial	$ 1.6
Los Angeles	$ 6.7
Orange	$ 4.4
Riverside	$ 6.1
San Bernardino	$ 2.6
Ventura	$ 0.7
Total	**$22.1**

Strategically Expanding Our System

While the RTP/SCS's multimodal strategy aims to reduce per capita vehicle miles traveled (VMT) over the next 25 years, total demand to move people and goods will continue to grow due to the region's population increase. A strategic expansion of our transportation system is needed in order to provide the region with the mobility it needs. The RTP/SCS targets this expansion around transportation systems that have room to grow, including transit, high-speed rail, active transportation, Express/HOT lanes, and goods movement. Some of these systems, such as transit, active transportation, and Express/HOT lanes, have proven over the years to be reliable and convenient forms of transportation for those who are able to easily access them. However, these systems must be improved and expanded in order to provide the accessibility and connectivity needed to become a truly viable alternative for the region as a whole. Other systems, such as high-speed rail, are new to the region and are needed to expand the number of choices available to our residents for convenient longer-haul travel. In addition, to address both the need to move more goods throughout the region for our growing population and maintain regional economic benefits of our goods movement industry, we must strategically expand our goods movement system in a way that addresses the associated quality of life issues.

Transit

The Plan calls for an impressive expansion of transit facilities and services over the next 25 years. The local county sales tax programs, most recently Measure R in Los Angeles County, are providing for most of this expansion in facilities and services.

The region should be proud of what it has accomplished so far and what it plans to accomplish beyond that by 2035. **EXHIBITS 2.2**, **2.3**, and **2.4** demonstrate this point. All three exhibits present the passenger rail system in the region. In 1990, as shown in **EXHIBIT 2.2**, the region did not have any passenger rail service at all. **EXHIBIT 2.3** shows how successful the region had been in building an extensive passenger rail network by 2010, a mere 20 years later. This RTP/SCS builds upon this success and proposes to strategically expand our rail system over the next 25 years. A more robust network in 2035 is depicted in **EXHIBIT 2.4**.

EXHIBIT 2.1 Major Highway Projects

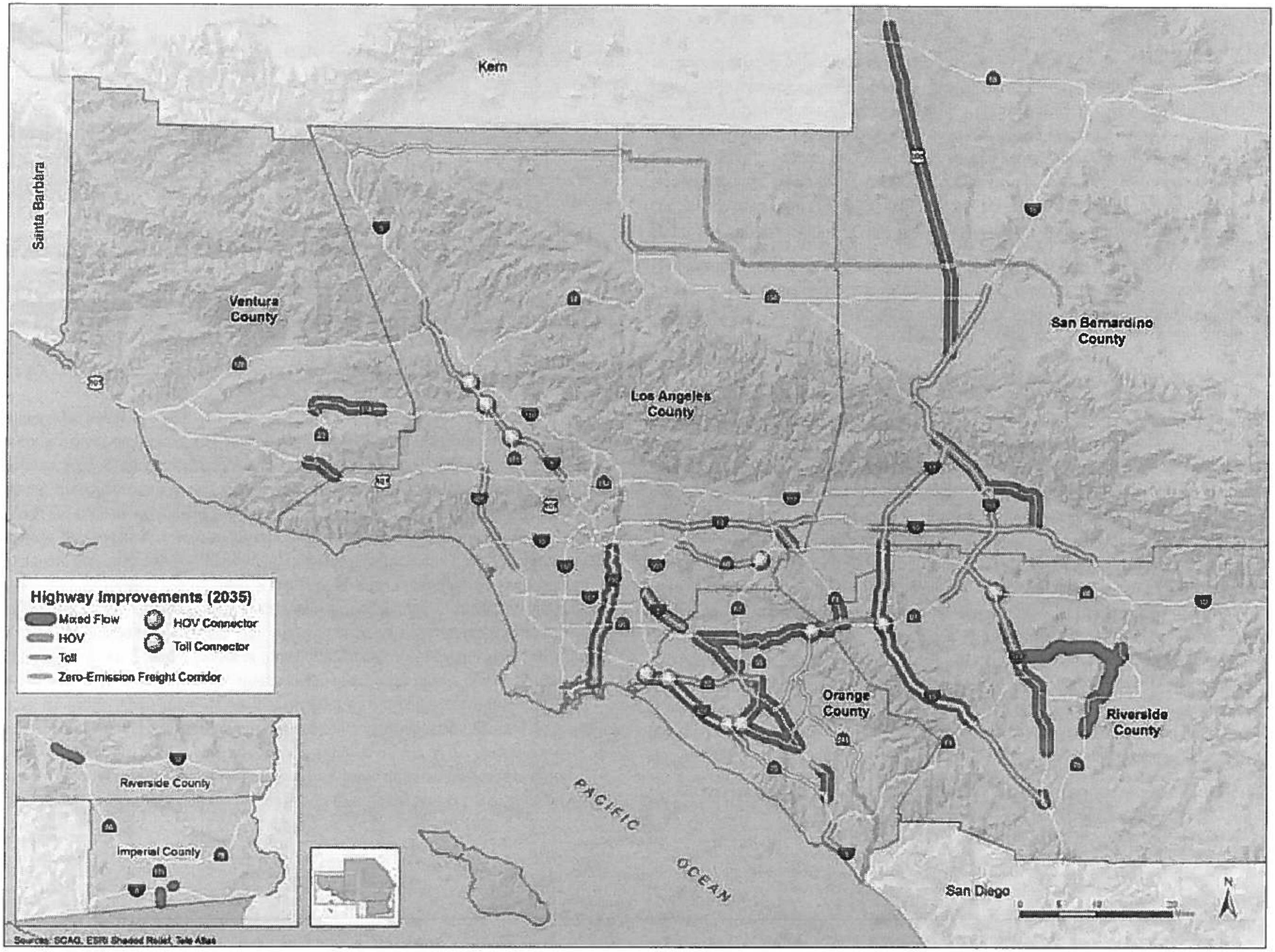


EXHIBIT 2.2 Rail Transit System (1990)

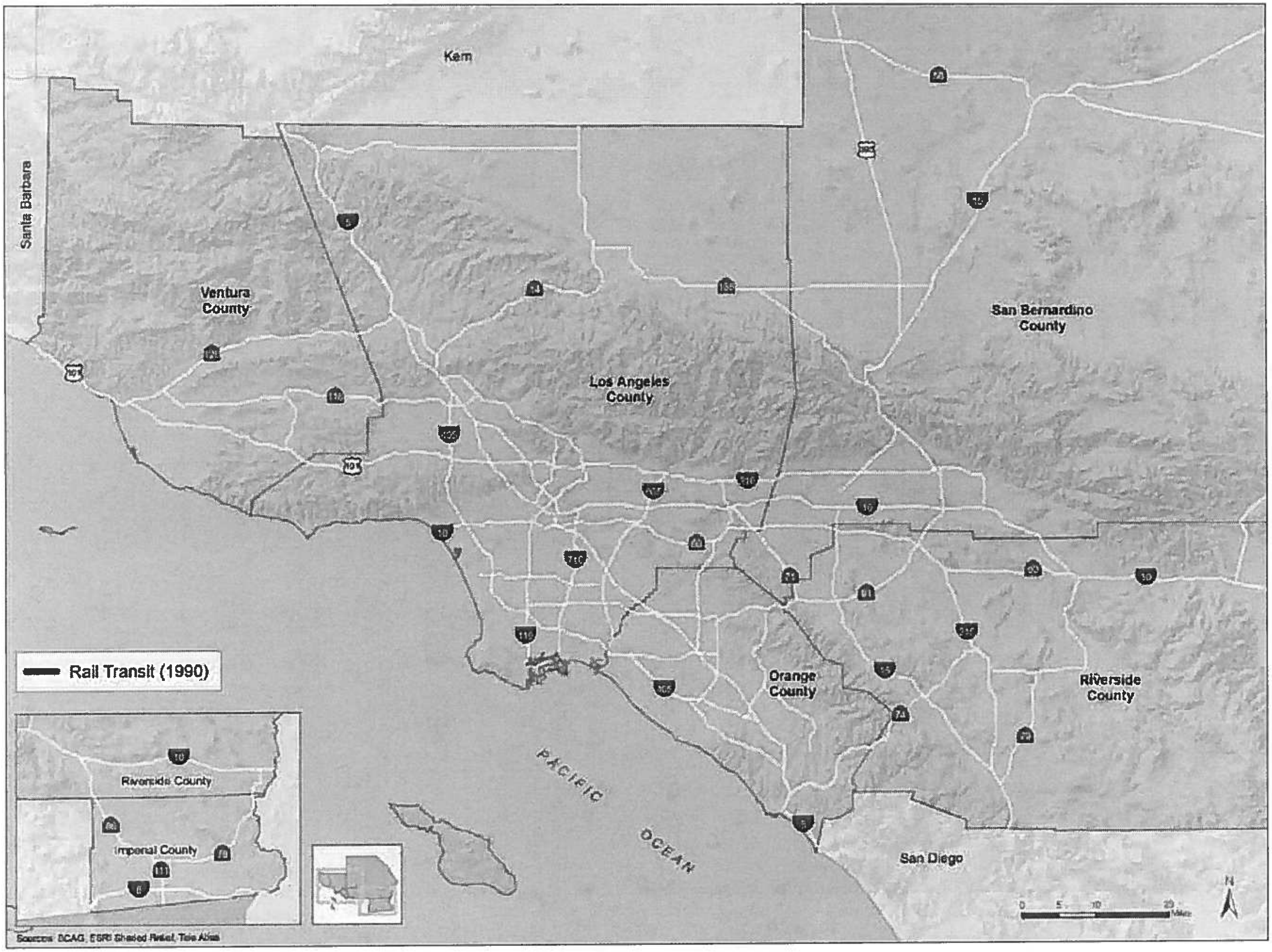


EXHIBIT 2.3 Rail Transit System (2010)

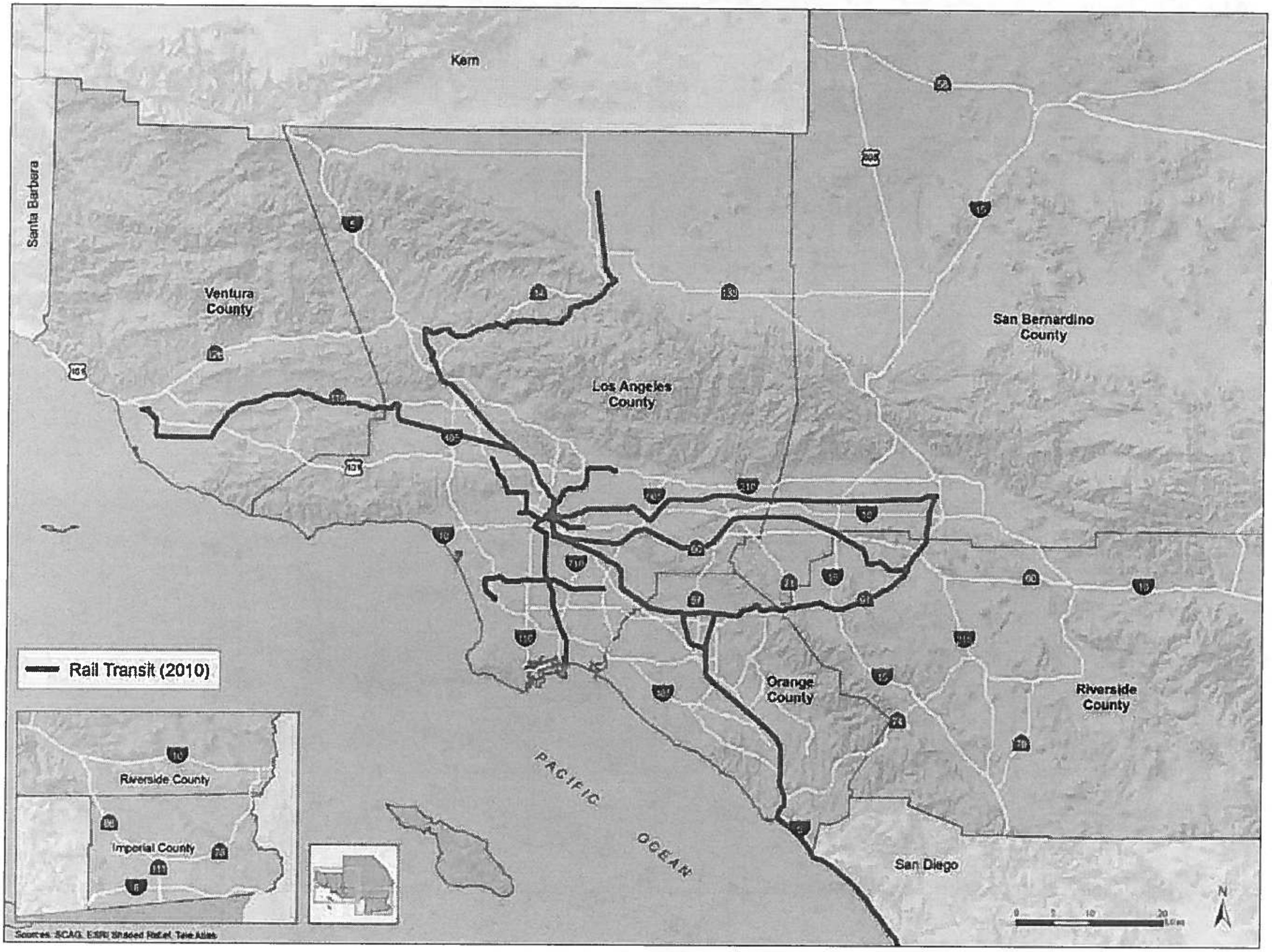
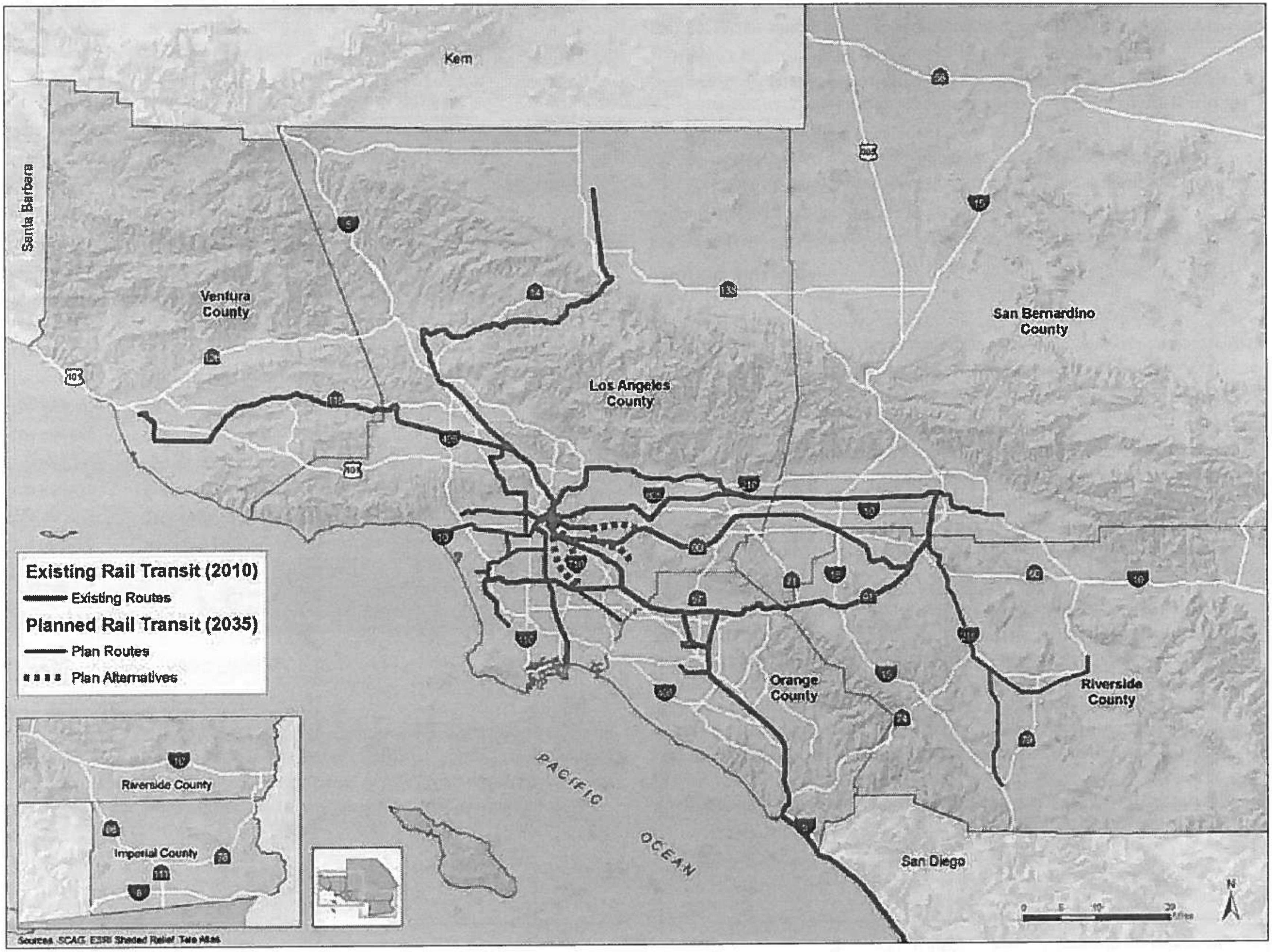


EXHIBIT 2.4 Rail Transit System (2035)



Once built out, Los Angeles County will have a greatly expanded rail network, adding entire new corridors and lengthening existing ones. Orange County will greatly improve its Metrolink service and implement a host of new bus rapid transit (BRT) routes, Riverside County will introduce various extensions to its Metrolink line, and San Bernardino County will introduce Redlands Rail.

TABLE 2.5 Major Transit Projects

County	Project	Completion Year*
Los Angeles	Crenshaw/LAX Transit Corridor	2018
Los Angeles	Gold Line Eastside Transit Corridor–Phase 2	2035
Los Angeles	Exposition Line–Phase 2 to Santa Monica	2018
Los Angeles	Gold Line Extension to Glendora	2018
Los Angeles	Gold Line Extension to Montclair	2035
Los Angeles	Green Line LAX Extension	2030
Los Angeles	South Bay Green Line Extension	2035
Los Angeles	Regional Connector	2020
Los Angeles	San Fernando Valley North/South Transitways	2018
Los Angeles	San Fernando Valley Orange Line Canoga Extension	2014
Los Angeles	West Santa Ana Branch Corridor	2030
Los Angeles	Westside Subway Extension to La Cienega	2023
Los Angeles	Westside Subway Extension to Century City	2030
Los Angeles	Westside Subway Extension to Westwood	2035
Orange	Anaheim Rapid Connection	2020
Orange	Bristol/State College, Harbor, and Westminster BRT	2030
Orange	Santa Ana/Garden Grove Fixed Guideway	2020
Riverside	Metrolink Perris Valley Line Extensions to San Jacinto and Temecula	2035
San Bernardino	E Street BRT (sbX)	2014
San Bernardino	Redlands Rail–Phase 1	2018
San Bernardino	Redlands Rail–Phase 2	2020

* Represents the Plan network year for which the project was analyzed for the RTP/SCS modeling and regional emissions analysis

These capital transit projects will provide our region with a much more mature public transportation system. Operational improvements and new transit programs and policies will also contribute greatly to attracting more trips to transit and away from single-occupancy vehicle (SOV) travel. First, the expanding HOV and Express/HOT lane networks call for the development of an extensive express bus point-to-point network. Second, transit-oriented and land use developments call for increasing the frequency and quality of fixed-route bus service by virtue of adding new BRT service, limited-stop service, increased frequencies along targeted corridors, and the introduction of local community circulators to provide residents of smart growth developments with the option of taking transit over using a car to make short, local trips.

Another emphasis on transit network improvements includes transit priority facilities, such as bus lanes and traffic signal priority. Our region has few existing dedicated bus lanes, but has implemented the Metro Orange Line, Harbor Transitway, and El Monte Busway. The Los Angeles County Metro Rapid Bus network employs bus signal priority that gives buses up to 10 percent more green light time from the normal green light phase. This should be expanded to other counties in our region.

Additional enhancements to our region's transit services include expanding bike-carrying capacity on transit vehicles; implementing regional and intercounty fare agreements and media, such as LA County's EZ Pass; and expanding and improving real-time passenger information systems.

TRANSIT POLICIES

In addition to the specific transit plans, projects, and programs proposed, the 2012–2035 RTP/SCS also supports the following policies and actions:

- Encourage the development of new transit modes in our subregions, such as BRT, rail, limited-stop service, and point-to-point express services utilizing the HOV and Express/HOT lane networks,
- Encourage transit providers to increase frequency and span of service in TOO and High-Quality Transit Areas (HQTAs) and along targeted corridors where there is latent demand for transit service,
- Collaborate with local jurisdictions to provide a network of local community circulators that serve new TOD and HQTAs, providing an incentive for residents and employees to make trips on transit,

- Oevelop "first mile/last mile" strategies on a local level to facilitate access to the transit system via local circulators, active transport, scrip, or vehicle sharing. Continue partnering with member cities and subregions to do localized "first mile/ last mile" planning,
- Encourage transit fare discounts and local vendor product and service discounts for residents and employees of TOD/HQTAs or for a jurisdiction's local residents in general who have fare media,
- Advocate for increased operational funding for transit service from state sources,
- Encourage transit properties to pursue cost-containment strategies,
- Work with cities to identify and mitigate choke points in the regional transportation system that affect transit, and
- Work with county transportation commissions, municipalities, and transit operators to develop dedicated bus facilities.


Image courtesy of Metro © 2012 LACMTA

Passenger and High-Speed Rail

The Plan proposes three Passenger Rail strategies that will provide additional travel options for long-distance travel within our region and to neighboring regions. These are improvements to the Los Angeles-San Oiego-San Luis Obispo (LOSSAN) Rail Corridor, improvements to the existing Metrolink system, and the implementation of Phase I of the California High-Speed Train (HST) project.

The recent release of the Oraft 2012 California HST Business Plan confirmed the funding and implementation challenges of the project. The plan now estimates a statewide Phase I cost of $98.5 billion (in year of expenditure dollars). Within the draft Business Plan, there are a variety of strategies to connect Northern and Southern California to the state network. This plan assumes that Phase I will be completed in 2033, but that incremental improvements can be made in advance of and in preparation for that connection. Further, a Central Valley Initial Operating Segment (IOS) may connect to the Metrolink system in Palmdale as early as 2021. Therefore, stakeholders throughout Southern California are seeking to implement a phased and blended implementation strategy for high-speed rail by employing state and federal high-speed rail funds to improve existing services, eventually meeting the Federal Rail Administration's (FRA) 110 MPH definition of high-speed service. These speed and service improvements to the existing LOSSAN and Metrolink corridors will deliver the California High-Speed Rail Authority's (Authority) new blended approach and at the same time permanently improve our region's commuter and intercity rail services.

IMPLEMENTATION OF PHASE I OF THE CALIFORNIA HIGH-SPEED TRAIN (HST) PROJECT

The Authority has worked since 1996 to plan and build an HST system linking Northern and Southern California. In 2005, the Authority issued a Programmatic Environmental Impact Report (EIR) selecting a Phase I alignment that would travel from Anaheim to Los Angeles, on to the Antelope Valley via the San Fernando Valley, along SR-99 through the San Joaquin Valley, and into the Bay Area via San Jose and along the San Francisco Peninsula. In January 2012, the Authority passed a resolution dropping the Grapevine alignment as an alternative to the Antelope Valley alignment after completing a second study comparing the two. This is supported by Metro, SCAG and the North Los Angeles County Subregion. Phase II would add connections to the Inland Empire, San Diego, Sacramento, and possibly the East Bay. In November of 2008, California voters approved Proposition 1A (Prop 1A), allocating $9 billion in bond funds for the project and another $950 million in funds for connecting projects. In 2009 and 2010, the FRA awarded the Authority $3.6 billion in High-Speed and Intercity Passenger Rail discretionary grants that will be used in the San Joaquin Valley as per FRA direction. As mentioned above, the new business plan has put total statewide Phase I construction costs at $98.5 billion (in year-of-expenditure dollars). Prop 1A also included $950 million for upgrading and improving connectivity for current rail services that will connect with the HST project, so the need to make speed and service improvements for our current rail services, coupled with the CHSRA's new blended implementation approach, calls for the need to spend these funds in the next few years.

The primary benefits of Phase I will be realized on a statewide level; however, our region's interregional travel facilities will also benefit. If successful, the HST system will attract many interregional trips now made by car or airplane, providing an alternative to congested interregional highways and relieving ground congestion near local airports. The Los Angeles to the Bay Area travel market is currently the nation's seventh-busiest aviation corridor and our region's second busiest. Phase I has the potential to free up gate space at regional airports for more international and long-haul routes, and relieve some airfield congestion. Similarly, when both Phase I and II are complete, the system will offer connectivity to Palmdale, Bob Hope (Burbank), Los Angeles, Ontario International, and San Bernardino International Airports, helping to meet SCAG's long-term goal of regionalizing air travel in Southern California. Phase I will also provide excellent regional connectivity. The planned HSR stops at Palmdale, Sylmar, Burbank Airport, Los Angeles Union Station, Norwalk, and Anaheim will readily connect with a robust network of intercity and commuter rail, subway and light rail, and fixed-route transit systems. All these connections will complement and feed each other, thereby boosting rail and transit ridership across our region.

IMPROVEMENTS TO THE LOSSAN RAIL CORRIDOR

Currently the SCAG region is served by a network of intercity passenger and commuter rail services. These services operate on the region's rail network, often sharing facilities with freight rail. They operate at higher speeds and have less frequent station stops than traditional transit services and are more likely to serve intercity and interregional trips.

As discussed in Chapter 1, intercity passenger rail service is operated by Amtrak, and commuter services are operated by the Southern California Regional Rail Authority (Metrolink). Amtrak's Pacific Surfliner traverses the 351-mile-long Los Angeles-San Diego-San Luis Obispo (LOSSAN) corridor. The Pacific Surfliner is the second-most-used service in Amtrak's national fleet, moving nearly 9 percent of the system's total national ridership. Surfliner ridership is growing over 8 percent a year. While Amtrak service remains a small portion of all transit trips in the region, it does provide a significant option for travel between regions.

Since the 1990s, stakeholders along the LOSSAN corridor have been participating in the LOSSAN Rail Corridor Agency, a Joint Powers Authority (JPA) that coordinates planning along the corridor with the goal of increasing safety, ridership, revenue, and reliability. In early 2010, the agency released a Strategic Assessment, which found that capital investment in speed and capacity improvements could serve latent demand along the corridor.

As such, the LOSSAN JPA partners have begun work on a Strategic Implementation Plan, which will guide service and business planning and provide a corridor-wide implementation plan for capital improvement projects. Strategies in the LOSSAN program will include intersection safety improvements such as installation of quad gates and raised medians, grade separations, the installation of sidings and double tracks, electronic and positive train control technologies, track straightening, and other speed and capacity improvements. Ultimately, it is hoped that express services in the corridor will travel between San Diego and Los Angeles in under two hours.

Image courtesy of the Southern California Regional Rail Authority (Metrolink)

IMPROVEMENTS TO THE EXISTING METROLINK SYSTEM

Similarly, the Southern California Regional Rail Authority is currently the sole operator of the Metrolink system, which serves primarily as a commuter rail service in our region. Metrolink operates 512 track miles of service along seven routes in Ventura, Orange, Los Angeles, San Bernardino, Riverside, and San Oiego Counties. Metrolink passengers travel much further than most transit passengers, having an average trip length of 36.9 miles. In Fiscal Year 2008–2009, Metrolink reported serving 12,241,830 passengers. Five routes, the Ventura County Line, the Antelope Valley Line, the Orange County Line, the Inland Empire/Orange County Line, and the SR-91 Line, share portions of the LOSSAN Corridor with the Pacific Surfliner.

Metrolink's service will also share a corridor with Phase I of the California High-Speed Train Project. The CA HST will provide a high-speed travel option to the Bay Area and the Central Valley via the existing Valley Subdivision, which is currently used by the Metrolink Antelope Valley Line (AVL). A recent express service demonstration project revealed that the Metrolink AVL travel time between Palmdale and Los Angeles Union Station could be shortened by 33 percent simply by skipping selected station stops. A study is underway to look at how to reduce this travel time even more significantly, and could include track straightening, grade separations, and track and siding expansions.

When Phase I of the state HST project is completed, Metrolink and Amtrak routes will serve as feeders, providing access to a new long-distance travel mode. Travelers are expected to access the state HST project at stations in the cities of Los Angeles, Burbank, San Fernando, Palmdale, Norwalk, and Anaheim. The Authority's 2009 Business Plan posits that passengers will travel between Los Angeles and San Francisco in less than three hours for about 80 percent of comparable airfare.

RAIL POLICIES

In addition to the specific plans, projects, and programs proposed, the 2012–2035 RTP/SCS supports the following policies and actions related to our passenger and high-speed rail program:

- Implement cooperative fare agreements and media between Amtrak and LOSSAN, and California HST when it begins revenue service,
- Implement cooperative marketing efforts between Amtrak and LOSSAN, and California HST when it begins revenue service,
- Encourage regional and local transit providers to develop rail interface services at Metrolink, Amtrak, and high-speed rail stations, and
- Work with the California High-Speed Rail Authority and local jurisdictions to plan and develop optimal levels of retail, residential, and employment development that fully take advantage of new travel markets and rail travelers.

Bus Transit

The RTP/SCS allocates additional funding to bus transit in the region. Fixed-route bus lines in the region are continuously evaluated and adjusted. Los Angeles County also offers bus rapid transit (BRT) on many of its core corridors. In addition, new services are planned across the region, including:

- Orange County's first BRT services and new trolley systems in Santa Ana, Anaheim, and Garden Grove,
- Riverside and San Bernardino Counties' first BRT services,
- Development of an extensive express bus point-to-point network based on the expanding HOV and Express/HOT lane networks,

Image courtesy of the Victor Valley Transit Authority

- Increasing the frequency and quality of fixed-route bus service and the introduction of local community circulators to provide residents of smart growth developments with the option of taking transit over using a car to make short, local trips, and
- The implementation of transit priority facilities, such as bus lanes and traffic signal priority.

Active Transportation

Active transportation refers to transportation such as walking or using a bicycle, tricycle, velomobile, wheelchair, scooter, skates, skateboard, push scooter, trailer, hand cart, shopping car, or similar electrical devices. For the purposes of the RTP/SCS, active transportation generally refers to bicycling and walking, the two most common methods. Walking and bicycling are essential parts of the SCAG transportation system, are low cost, do not emit greenhouse gases, can help reduce roadway congestion, and increase health and the quality of life of residents. As the region works toward reducing congestion and air pollution, walking and bicycling will become more essential to meet the future needs of Californians.

The majority of commuters within the SCAG region commute via car, truck, or van. According to the American Community Survey, in 2009, more than 85 percent of all commuters traveled to work by car, truck, or van, and less than 4 percent traveled to work via an active transportation mode (0.7 percent bicycled and 2.5 percent walked to work). In addition, the National Household Travel Survey (NHTS) data indicate that approximately 20.9 percent of all trips were conducted by walking (19.2 percent) or bicycling (1.7 percent). This represents an approximately 75 percent increase from the 11.9 percent active transportation mode share in 2000. In addition, NHTS data indicate that 75.0 percent of all trips in 2009 were conducted by driving, and this is an approximately 10.6 percent decrease from the 83.9 percent mode share in 2000.

Additional analysis regarding active transportation needs to be conducted in order to develop a better understanding of the users and their needs. The current level of data is extremely limited and does not provide a comprehensive overview of the current active transportation community. Active transportation users have differing levels of experience and confidence, which influences their decision to utilize active transportation. SCAG recognizes that there are a number of factors that motivate people to use active transportation. Increased data collection may provide a clearer understanding of the needs and deficiencies associated with active transportation.

Active transportation is not only a form of transportation in itself; it is also a means by which to access rail and bus service. Accessibility is one of the primary performance measures used to evaluate active transportation, by measuring how well the current infrastructure provides individuals with the opportunity to access destinations or facilities.

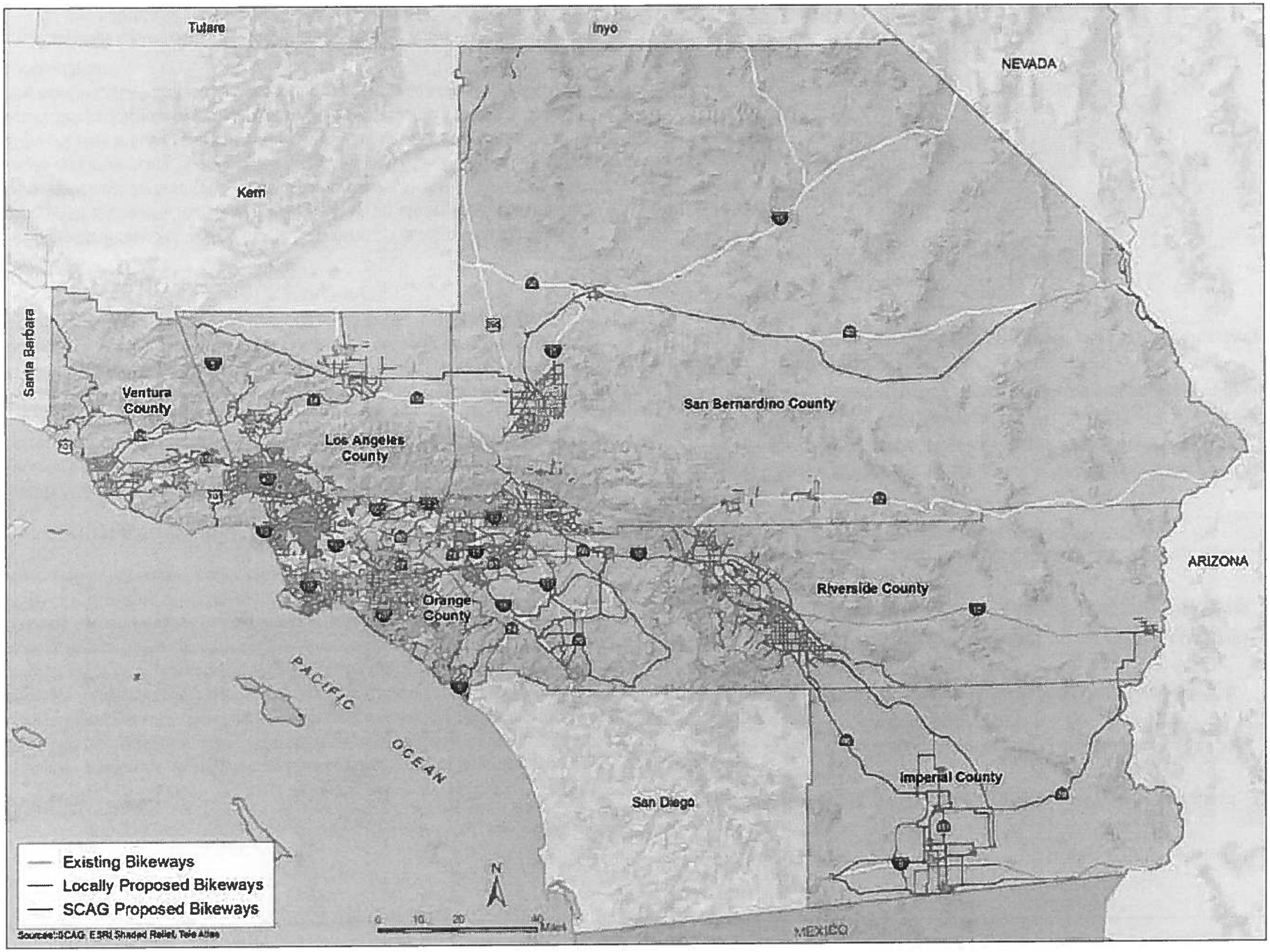
Using a two-mile buffer for bicyclists and a half-mile buffer for pedestrians, we found that our current transit infrastructures provides 97 percent of our residents access to transit via bicycle and 86 percent access to transit by walking. While many individuals have access to transit stations by biking or walking, numerous other factors may influence an individual's decision to use active transportation.

Safety is an important factor that individuals consider when determining whether or not they should walk or bike to their destination. Based on data from the Statewide Integrated Traffic Records System (SWITRS), in 2008, 4.0 percent of all traffic-related fatalities in the SCAG region involved bicyclists, and 4.3 percent of all traffic-related injuries involved bicyclists. In addition, 20.9 percent of all traffic-related fatalities in the SCAG region involved a pedestrian, and 5.7 percent of traffic-related injuries involved pedestrians.

While each of the counties in the SCAG region currently has its own active transportation plan, the RTP/SCS aims at developing a regional active transportation system that closes the gaps and provides connectivity between counties and local jurisdictions. While bicyclists are legally allowed to use any public roadway in California unless specifically prohibited, many bicyclists may be more inclined to utilize bikeways. Currently, 42.6 percent of the region's residents have easy access to 4,315 miles of bikeways. Local jurisdictions in the region have proposed an additional 4,980 miles of bikeways in this RTP/SCS that would increase this access to 62.4 percent of all residents. In order to close the remaining gaps in the bikeway network, this RTP/SCS goes a step further to include an additional 827 miles of bikeways to complete the SCAG Regional Bikeway Network.

In order to make active transportation a more attractive and feasible mode of travel for the different users in our region, additional infrastructure improvements need to be made. The 2012–2035 RTP/SCS calls for improvements that would bring significant amount of deficient sidewalks into compliance with the Americans with Disabilities Act (AOA). Given that all trips, including vehicular trips, start with walking, it is important to ensure that the sidewalks and streets are accommodating to all users. In all, the RTP/SCS's active transportation improvements exceed $6.7 billion.

EXHIBIT 2.5 Regional Bicycle Network



COASTAL TRAILS

In addition to bikeways, local trails have played an important role in increasing accessibility and providing opportunities for active transportation. Trails along the coast of California have been utilized as long as people have inhabited the region. In an effort to develop a "continuous public right-of-way along the California coastline, a trail designed to foster appreciation and stewardship of the scenic and natural resources of coastal trekking through hiking and other complementary modes of non-motorized transportation," the California Coastal Trail (CCT) was established. SCAG proposes the completion of the CCT to increase active transportation access to the coast. Completion of the CCT would provide 183 miles of multipurpose trails.

SAFE ROUTES TO SCHOOL

SAFETEA-LU established the Safe Routes to School (SRTS) program to "enable and encourage primary and secondary school children to walk and bicycle to school" and to support infrastructure-related and behavioral projects that are "geared toward providing a safe, appealing environment for walking and bicycling that will improve the quality of our children's lives and support national health objectives by reducing traffic, fuel consumption, and air pollution in the vicinity of schools." Safe Route to School programs can play a critical role in eliminating some of the vehicle trips that occur during peak periods to drop off or pick up students by ensuring safe routes to bike or walk to school.

COMPLETE STREETS

The Complete Streets Act of 2008 (AB 1358) requires cities and counties to incorporate the concept of Complete Streets in their General Plan updates to ensure that transportation plans meet the needs of all users of our roadway system. SCAG supports and encourages implementation of Complete Streets policies in the 2012–2035 RTP/SCS. SCAG will work with the local jurisdictions as they implement Complete Streets strategies within their jurisdictions by providing information and resources to support local planning activities. SCAG also supports the following policies and actions related to active transportation:

- Encourage and support local jurisdictions to develop "Active Transportation Plans" for their jurisdictions if they do not already have one,
- Encourage and support local jurisdictions to develop comprehensive educational programs for all road users,
- Encourage local jurisdictions to direct enforcement agencies to focus on bicycling and walking safety to reduce multimodal conflicts,
- Support local advocacy groups and bicycle-related businesses to provide bicycle-safety curricula to the general public,
- Encourage children, including those with disabilities, to walk and bicycle to school,
- Encourage local jurisdictions to adopt and implement the proposed SCAG Regional Bikeway Network,
- Support local jurisdictions to connect all of the cities within the SCAG region via bicycle facilities,
- Encourage local jurisdictions to complete the California Coastal Trail,
- Encourage the use of intelligent traffic signals and other technologies that detect slower pedestrians in signalized crosswalks and extend signal time as appropriate,
- Support the facilitation, planning, development, and implementation of projects and activities that will improve safety and reduce traffic and air pollution in the vicinity of primary and middle schools, and
- Encourage local jurisdictions to prioritize and implement projects/policies to comply with ADA requirements.

Express/HOT Lane Network

Oespite our concerted effort to reduce traffic congestion through years of infrastructure investment, the region's system demands continue to exceed available capacity during peak periods. Consistent with our regional emphasis on the mobility pyramid (**FIGURE 2.1**), recent planning efforts have focused on enhanced system management, including integration of pricing to better utilize existing capacity and to offer users greater travel time reliability and choices. Express/HOT Lanes that are appropriately priced to reflect demand can outperform non-priced lanes in terms of throughput, especially during congested periods. Moreover, revenue generated from priced lanes can be used to deliver the needed capacity provided by the Express/HOT Lanes sooner and to support complementary transit investments.

Based on recent analysis of critical corridors performed for the CSMPs, intercounty trips comprise more than 50 percent—suggesting the value of a regional network of Express Lanes that would seamlessly connect multiple counties. As such, the 2012–2035 RTP/SCS includes a regional Express/HOT Lane network that would build upon the success of the SR-91 Express Lanes in Orange County and two demonstration projects in Los Angeles County planned for operation in late 2012.

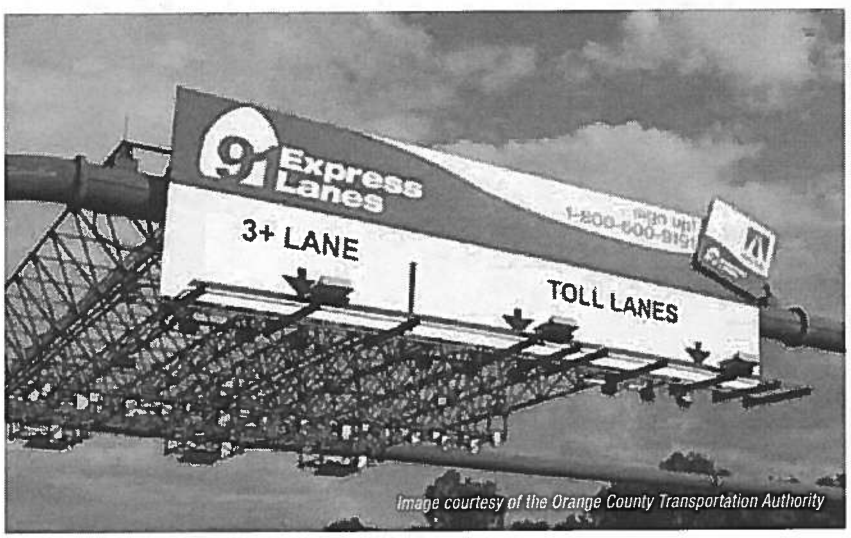


Image courtesy of the Orange County Transportation Authority

Additional efforts underway include the extension of the SR-91 Express Lanes to I-15 in Riverside County along with planned Express Lanes on I-15. Also, traffic and revenue studies are proceeding for I-10 and I-15 in San Bernardino County.

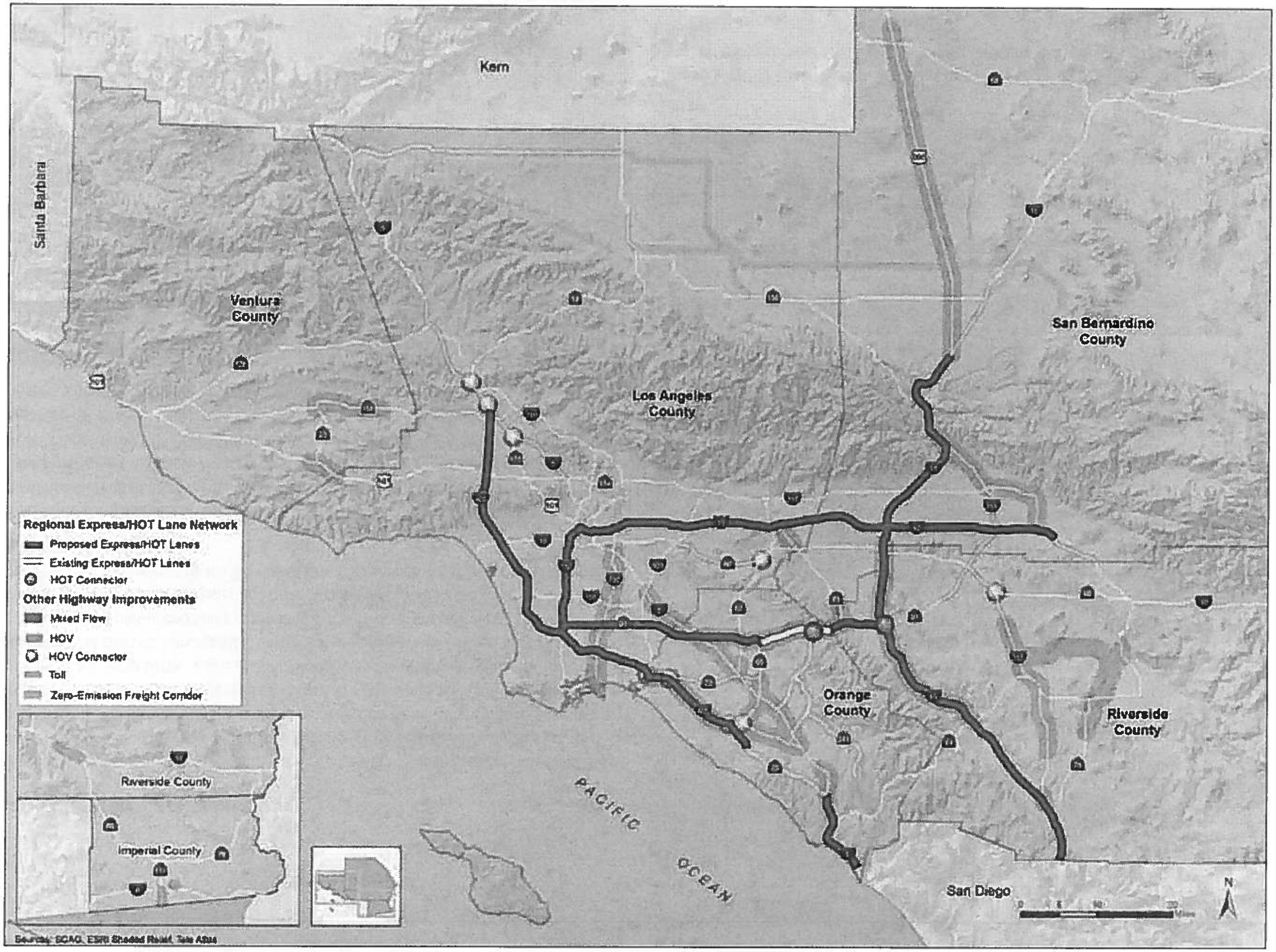
TABLE 2.6 and **EXHIBIT 2.6** display the segments in the proposed Express Lane network.

TABLE 2.6 Express/HOT Lane Network

County	Route	From	To
Los Angeles	I-405	I-5 (North SF Valley)	LA/OC County Line
Los Angeles	I-110	Adams Blvd (s/o I-10)	I-405
Los Angeles	I and SR-110/	Adams Blvd	US-101
Los Angeles	US-101	SR-110	I-10
Los Angeles	I-10	US-101	I-710
Los Angeles	I-10	I-710	I-605
LA, Orange	SR-91	I-110	SR-55
LA, SB	I-10	I-605	I-15
Orange	I-405	LA/OC Line	SR-55
Orange	I-5	SR-73	OC/SO County Line
Orange	SR-73	I-405	MacArthur
Riverside	SR-91	OC/RV County Line	I-15
Riverside	I-15	Riv/SB County Line	SR-74
Riverside	I-15	SR-74	Riv/SD County Line
San Bernardino	I-10	I-15	SR-210
San Bernardino	I-10	SR-210	Ford St
San Bernardino	I-15	SR-395	Sierra Ave
San Bernardino	I-15	Sierra Ave	6th St
San Bernardino	I-15	6th St	Riv/SB County Line

The Express/HOT Lane Network is assumed to be operational by 2035. Implementation plans, including corridor limits, will be refined through the Express Travel Choices Phase II Study.

EXHIBIT 2.6 Express/HOT Lane Network



Meeting Our Airport Demand

Although at a rate much slower than those seen in previous decades, air travel in the SCAG region continues to grow and is expected to pick up the pace when the region economically recovers. This RTP/SCS's regional air passenger demand forecast of 145.9 million annual air passengers (MAP) in 2035 is a very conservative forecast compared to forecasts adopted by past SCAG RTPs, such as the 165.3 MAP 2035 forecast adopted by the 2008 RTP. However, like previous forecasts, this new long-range forecast is also based on interim forecasts that show the urban capacity-constrained airports of Los Angeles International (LAX), Bob Hope, Long Beach, and John Wayne all reaching their defined legally allowable or physical capacity constraints well before 2035. The remaining air travel demand is served by the other, suburban airports with ample capacity to serve future demand, including Ontario International, San Bernardino International, March Inland Port, Palmdale Regional, Southern California Logistics, and Palm Springs airports. A small amount of future air passenger demand would also be served by the two commuter airports in the region, Oxnard and Imperial airports.

TABLE 2.7 displays Low Growth, Baseline/Medium Growth, and High Growth air passenger forecast scenarios that were considered for inclusion in this RTP/SCS. At 164 MAP in 2035, the High Growth Scenario is only slightly less than the 165.3 MAP forecast adopted for the 2008 RTP in 2035, and its average annual growth rate is consistent with recent industry forecasts developed by the FAA, Boeing, and Airbus. This Plan's regional air passenger demand forecast is the Baseline/Medium Growth Forecast that is more conservative than the High Growth Scenario and is consistent with recent passenger trends. At 145.9 MAP, it is virtually identical to the Constrained/No Project Scenario that was modeled for the 2008 RTP. **FIGURE 2.4** shows the airport allocations for this RTP/SCS's regional air passenger demand forecast.

The Plan's regional air passenger demand forecast recognizes defined legally allowable and physical capacity constraints at the constrained urban airports, including LAX, Bob Hope, Long Beach, and John Wayne. However, the legal settlement agreement constraints at both LAX and John Wayne expire in the 2015–2020 time period. Relaxation or elimination of these constraints could significantly impact forecast allocations of aviation demand at other airports in the region. For example, relaxation of the 78.9 MAP settlement agreement constraint at LAX could significantly impact the future demand at nearby Bob Hope Airport. (The Burbank-Glendale-Pasadena Airport Authority does not think that Bob Hope Airport will exceed 8.0 MAP in 2035 because of the likelihood that LAX will exceed its settlement agreement constraint before that date.) Future updates of the regional aviation passenger demand forecast, such as for the 2016 RTP, will incorporate any new information provided by local authorities on revised legally-allowable or physical capacity constraints at capacity-constrained airports in the region.

At 5.61 million tons of cargo in 2035, this RTP/SCS's regional air cargo demand forecast is also much more conservative than what was adopted by the 2008 RTP for 2035 (8.28 million tons). **FIGURE 2.5** shows the airport allocations for this RTP/SCS's regional air cargo demand forecast. A more complete discussion of the methodology used to develop these forecasts can be found in the Aviation and Airport Ground Access Appendix.

TABLE 2.7 2035 Airport Forecasts (Million Annual Air Passengers)

Airport	Low	Baseline	High
Bob Hope	9.4	9.4	9.4
John Wayne	10.8	10.8	10.8
LAX	78.9	78.9	78.9
Long Beach	4.2	4.2	4.2
March Inland Port	0.4	0.6	2.5
Ontario	19.2	30.7	31.6
Palmdale	1.6	2.6	6.1
Palm Springs	2.6	4.1	9.6
San Bernardino	1.8	2.8	6.7
SoCal Logistics	0.4	0.7	1.6
Imperial	0.6	0.9	2.1
Oxnard	0.1	0.2	0.5
Total	**130.0**	**145.9**	**164.0**

FIGURE 2.4 2035 Air Passenger Demand Airport Allocations

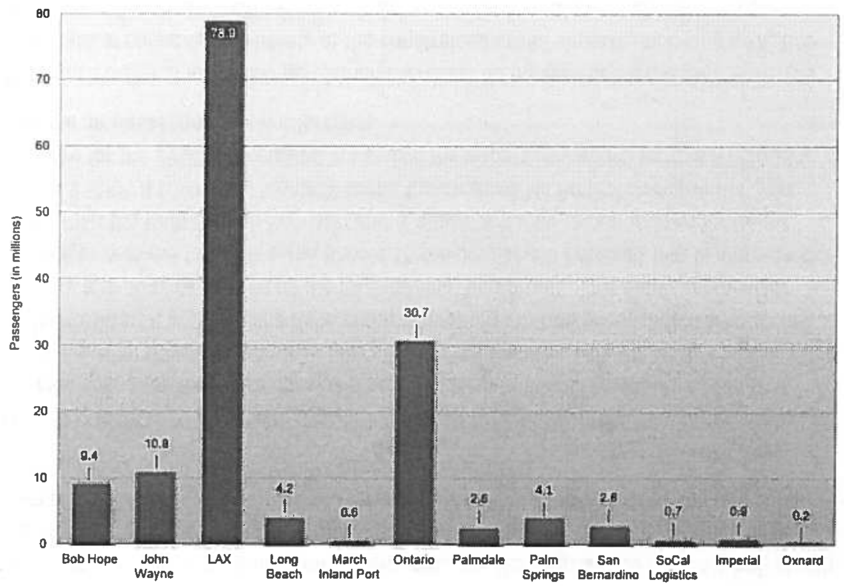
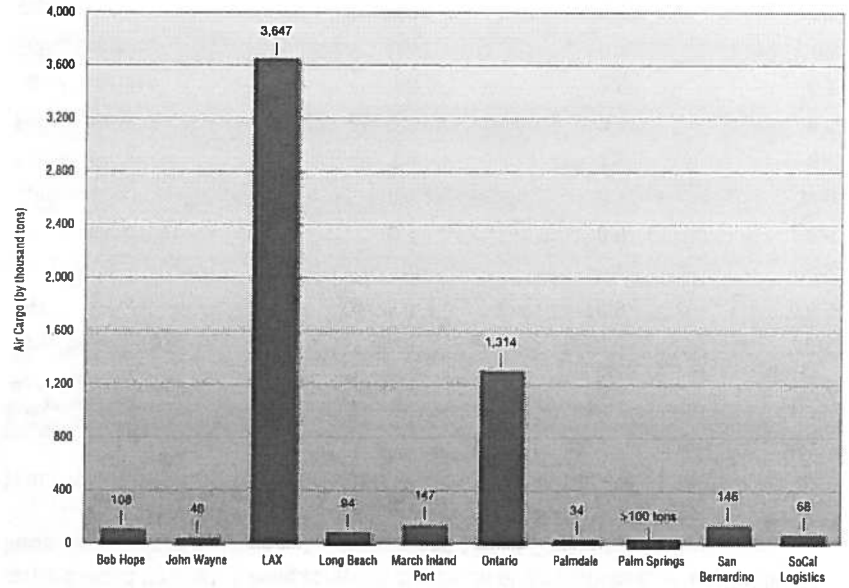


FIGURE 2.5 2035 Air Cargo Demand Airport Allocations



The past few years have seen deep cutbacks in flights by the airlines, particularly at mid-sized airports. There have also been several significant mergers in the U.S. airline industry. These mergers will likely lead to the elimination of duplicate service that may decrease airline competition, increase fares, and reduce the number of flights in many markets. However, the merged carriers may find it advantageous to offer service at multiple airports in a given market, rather than add frequency at LAX. The other recent dynamic in the aviation industry has been the transition of the low-cost carriers, as they have gained market share, from primarily serving secondary airports in large metropolitan regions to competing directly with the legacy network carriers at the primary airport. A recent example is the decision by both Virgin America and Southwest to introduce or expand service at LAX, rather than primarily serve the region through the secondary airports. One consequence of this strategy has been a significant decline in passenger traffic at both Bob Hope Airport and Ontario International Airport.

These and other recent trends call into question the ability to shift air traffic from the existing constrained airports in the urban core to the outlying/suburban airports that have the capacity to accommodate the forecast growth, which is necessary to meet this RTP/SCS's 145.9 MAP forecast in 2035. In order to attract the number of passengers to the suburban airports envisaged in the 2035 regional air passenger demand forecast, some incentives are likely to be needed to encourage airlines to offer service at these airports. Potential incentives fall into three broad categories:

1. Improvements to the airport ground access system that would make the alternate airports more accessible to travelers from those parts of the region that currently find the core urban airports more convenient,
2. Measures that would reduce the cost to the airlines of offering service at the alternate airports, either through direct subsidy or by reducing airport fees and charges relative to the more congested airports, and
3. Marketing programs to encourage air travelers to consider using the air services at the alternate airports.

General Aviation

SCAG also updated regional general aviation demand forecasts for the 44 general aviation airports in the region, as well as for the 10 commercial airports in the region that support general aviation activity. Regional general aviation demand forecasts were last developed by SCAG in 2003. The new forecasts employed a sophisticated "cohort" methodology that considers the amount of flying done by pilots as they pass through different age groups and the extent to which older pilots are replaced by new pilots. The forecast shows a decline in regional general aviation operations by about 32 percent from 2010 to 2035. The main reason for the anticipated decline is the fact that the aging pilot population is not expected to be adequately replenished by new student pilot starts. The regional general aviation demand forecast and methodology can be found in the Aviation and Airport Ground Access Appendix.

Airport Ground Access Strategy

Improvements to airport ground access (and egress) fall under SCAG's domain of responsibility. SCAG works closely with the airport authorities and county transportation commissions to identify and pursue implementation of specific projects. To be effective in attracting passengers to air service at the alternate airports, ground access improvements will need to significantly reduce the travel time and/or cost of accessing the alternate airports. This is likely to be a particular concern with airports such as Palmdale, which is almost 70 miles from downtown Los Angeles and around 50 miles from communities in the San Fernando Valley.

While the cost of significantly reducing freeway travel times beyond those improvements that will be implemented for other reasons would be prohibitive, particularly for the relatively small number of travelers likely to use the alternate airports, there may be opportunities to take advantage of improved transit and rail services that are being planned. These include the extension of the Metro Gold Line to Ontario and improvements to Metrolink service on the Antelope Valley and San Bernardino lines. While the volume of airport passengers alone would not justify the cost of these projects, if they are being done anyway to address other travel needs, SCAG can collaborate with the relevant agencies to ensure that the connections to the alternate airports are well planned and marketed. In the case of Ontario Airport, airport passenger volumes may be high enough to support express bus service from remote terminals at such locations as the Anaheim Regional Transportation Intermodal Center, Los Angeles Union Station, and the Van Nuys FlyAway terminal in the San Fernando Valley. These facilities all currently exist or will by 2035, so it would only be necessary to operate the bus service. These services may need to be subsidized until ridership reaches a level where the fare revenue can support the operation. SCAG could work with local airport authorities and regional transportation agencies to develop a regional consensus for identifying new sources of funding for these services. Potential sources of funding could include charging fees for private vehicles picking up and dropping off passengers at the congested airports. This would have a number of advantages:

- It would encourage resident passengers to use airport parking instead of being dropped off and picked up, which would increase airport revenues,
- By discouraging pick-up and drop-off trips, it would reduce vehicle trips generated by the airport on surrounding streets, and
- It would encourage more passengers to use public transportation or express buses from remote terminals, which would reduce vehicle miles of travel (VMT) on the region's arterial and freeway system.

It is unlikely that the volumes of air passengers at the other three alternate airports would be high enough to support dedicated express bus service. It might be feasible to serve San Bernardino International Airport as an extension of express bus service to Ontario Airport from Union Station or Van Nuys.

A more thorough discussion and listing of recommended ground access projects for each airport, both roadway and public transit projects, can be found in the Airport Ground Access Element in the Aviation and Airport Ground Access Appendix.

AIRPORT FINANCIAL STRATEGY

SCAG does not have a source of funding to provide subsidies for air service or to reduce airport fees and charges to the airlines. SCAG can work with the various airport authorities in the region and build a regional consensus to establish a regional funding mechanism to support the development of airport facilities and infrastructure at the alternate airports, using revenues generated at the congested airports as part of efforts to limit traffic growth at those airports. This strategy is currently prohibited by the U.S. Department of Transportation regulations on airport revenue diversion, except in cases where both airports are operated by the same airport authority. If a regional consensus of airport authorities is developed for advancing a regional airport financial strategy, SCAG can work with the congressional representatives from the region to obtain legislation that allows joint programs by congested and uncongested airports, even if they are operated by different agencies. Over the long term, congested airports may have an interest in shifting traffic to less-congested airports. For airports like LAX, which has a significant component of international traffic that generates more revenue than domestic flights, it may be more efficient to limit domestic flights that could be accommodated at other airports in the region, thereby freeing up capacity for more lucrative international flights.

AIRPORT MARKETING STRATEGY

SCAG does not have a source of funding to support marketing efforts to encourage air travelers in the region to consider using air service at the alternate airports. There is potential for the various airport authorities and the region's business community to develop a regional consensus to initiate a region-wide marketing effort to promote alternatives to the use of congested airports. This program could be funded through a variety of sources, such as airport parking and rental car transactions. SCAG would need to work with the various stakeholders to identify the benefits of an effective marketing program to all the region's airports and develop a regional consensus on how to fund and implement such a program.

AIRPORT POLICIES AND ACTION STEPS

This section outlines the additional policies and action steps associated with the aviation program contained in this RTP/SCS.

Regional Aviation Demand, Airport Infrastructure, and Airport Ground Access

The following outlines key policies:

- The capability of uncongested secondary airports in the region to accommodate future aviation demand, where such growth is desired, should be preserved during periods of declining or stagnant air traffic
- Uncongested secondary airports in the region, where additional activity is desired, should be supported through appropriate incentives, marketing, and projects that enhance their capacity and regional accessibility
- The factors that most influence the growth in demand for air travel and the composition of the market should be identified
- A regional consensus should be developed on how best to support the development of new air services at uncongested secondary airports, where such growth is desired
- State-of-the-art aviation demand forecast methodologies should be employed to accurately forecast future aviation demand in the region's complex multi-airport system, and regional aviation demand forecasts should be regularly updated to address changing conditions
- Existing and planned regional highway and high-occupancy transit improvements should be leveraged to the extent possible to increase the regional accessibility of uncongested secondary airports, where traffic is desired, while minimizing improvement needs

The following outlines additional action steps to improve aviation and airport ground access in the region:

- Work with the region's airport operators to conduct a region-wide air passenger survey on an ongoing basis, designed to enhance and inform regional aviation demand forecasting and airport marketing efforts
- Develop an in-house aviation demand forecasting model that can support the development of future forecasts and allocation of forecast demand to airports in a complex multi-airport regional system. The model should be fully integrated with SCAG's regional transportation model and should have airport ground access modeling capabilities

- Work with the region's airport operators and business community to define a region-wide marketing effort to promote alternatives to increased use of congested urban airports, consistent with the policy directions of airport operators
- Identify and define incentives that airports can effectively use to encourage airlines to provide new air service
- Establish a Regional Airport Ground Access Task Force to define potential projects and programs to improve airport accessibility to secondary airports and reduce vehicular traffic generated by the large urban airports. The task force would help plan and promote rail and express bus service improvements and extensions to airports in the region, as well as an integrated regional system of remote air terminals ("FlyAways")

Airport Economics, Finance, and Funding

The following policies are related to Airport Economics, Finance, and Funding:

- New funding mechanisms should be identified for implementing regional infrastructure and airport ground access improvements
- Efforts by airport operators to develop strategic financial plans and explore non-aeronautical revenue-generating use of underutilized airport property should be supported
- Strategies that enhance the economic contribution of aviation to the regional economy should be identified and implemented

The following are recommended action steps:

- Sponsor and support new legislation that allows for more flexible use of airport revenues for off-airport ground access projects when requested by airport operators
- The Airport Ground Access Task Force should explore and develop potential new funding sources to support specific projects they have identified for improving regional airport accessibility
- Coordinate with the region's county transportation commissions and other transportation agencies to include joint funding of airport ground access projects identified in SCAG's Regional Transportation Plan in those agencies' plans
- Conduct regional aviation economic impact studies that identify the economic benefits to the region of different types and levels of regional aviation activity and the likely economic impacts of implementing alternative policy options for serving future regional aviation demand

Airport Land Use Compatibility and Environmental Impacts

The following policies are related to Land Use Compatibility and Environmental Impacts:

- Promote increased coordination between airport planning and land use planning on both regional and local levels
- Regional support and coordination should be extended to the region's airport land use commissions
- Disseminate information on aviation environmental "best practices"
- Support mechanisms for promoting cleaner and quieter aircraft at the region's

The following are related action steps:

- Continue to pursue airport "smart growth" projects, using the Airport Smart Growth Framework developed for the Chino Airport Smart Growth Demonstration Project and applying it to different airport settings
- Incorporate airport "smart growth" land use principles in land use forecasts used by future regional transportation plans
- Periodically conduct information sharing forums for the region's airport land use commissions in cooperation with the Caltrans Division of Aeronautics on "best practices" for airport land use compatibility planning
- Serve as a clearinghouse for information on aviation environmental "best practices" by airports for mitigating air, noise, and water pollution; and reducing greenhouse gas emissions
- Support legislation for creating substantial incentives for airlines to upgrade their aircraft fleets to cleaner, quieter aircraft and NextGen-compatible aircraft

Airspace Planning and New Technologies

The following are policies related to Airspace Planning and New Technologies:

- Modifications to the regional airspace system that reduce potential airspace conflicts, increase passenger safety, reduce costs to airlines, and reduce noise and air quality impacts should be identified and promoted Opportunities should be pursued for increasing the region's airspace capacity, reducing potential future airspace conflicts, and increasing airline efficiencies through new navigation and air traffic control technologies

- Existing and potential future airspace constraints should be incorporated into regional aviation planning

The following are related action steps:

- Continue to coordinate and provide input to the FAA's Optimization of Airspace and Procedures in the Metroplex (OAPM) Program for Southern California and similar airspace modernization activities, including updated operational forecasts
- SCAG Aviation Technical Advisory Committee (ATAC) should continue and enhance its coordination with the Southern California Airspace Users Working Group (SCAUWG) on airspace issues of regional importance
- Continue to advocate that the region should serve as an early "test bed" for the phased implementation of new airspace technologies, including new satellite-based NextGen technologies developed by the FAA, that have the potential to reduce airspace conflicts and reduce noise and air quality impacts on local communities
- Explore how new navigation and air traffic control technologies can contribute to the region's airspace capacity and should incorporate potential airspace constraints in aviation demand forecasts developed for future regional transportation plans

Goods Movement System

System Vision

Improving Southern California's global competitiveness is critical to a vibrant economy. Reliable freight transportation infrastructure, to move goods to market, is essential to support the SCAG regional economy and quality of life. In 2010, over 1.15 billion tons of cargo valued at almost $2 trillion moved across the region's system.[1] Whether carrying imported goods from the San Pedro Bay Ports to regional distribution centers, supplying materials for local manufacturers, or delivering consumer goods to SCAG residents, the movement of freight provides the goods needed to sustain regional industries and consumer needs on a daily basis.

Working with its public and private-sector partners, SCAG has established a vision for the goods movement system that is reflected in the 2012–2035 RTP/SCS.

A world-class, coordinated Southern California goods movement system that accommodates growth in the throughput of freight to the region and nation in ways that support the region's economic vitality, attainment of clean air standards, and the quality of life for our communities

[1] FHWA Freight Analysis Framework: http://faf.ornl.gov/fafweb/Extraction0.aspx.

Key Function and Markets

The goods movement system has developed in the SCAG region to serve a wide range of user markets. Each of these markets has unique performance needs that dictate the components of the system that they will use. A brief summary of these markets follows.

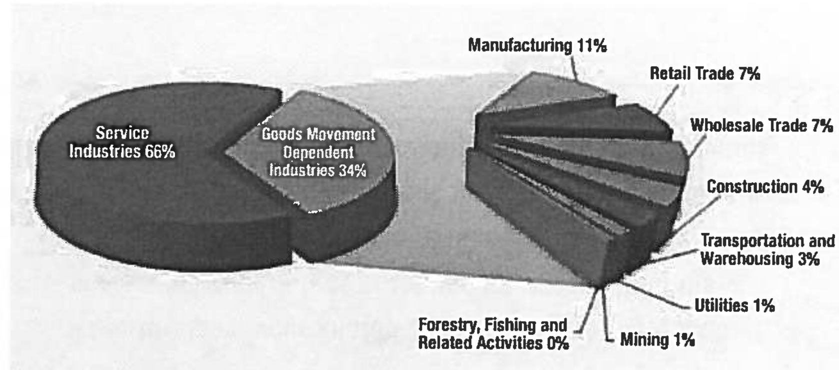
INTERNATIONAL TRADE

The SCAG region is the largest international trade gateway in the U.S. In 2010, the Los Angeles Customs District (which includes the Ports of Los Angeles, Long Beach, and Hueneme and Los Angeles International Airport) handled $336 billion of maritime cargo and $78 billion of air cargo. In the same year, $10.4 billion of trade passed through the international ports of entry (POEs) between the U.S. and Mexico in Imperial County. Trade moving through these international gateways is supported by an extensive transportation system including a highly developed network of roadways and railroads, air cargo facilities, intermodal facilities, and an abundance of regional distribution and warehousing clusters.

DOMESTIC AND LOCAL GOODS MOVEMENT

An overwhelming majority of the goods movement activity in the SCAG region is generated by local businesses moving goods to local customers and supporting national domestic trade systems. These businesses are sometimes referred to as "goods movement-dependent industries." In 2010, these industries, including manufacturing, wholesale and retail trade, construction and warehousing, employed over 2.9 million people throughout the region and contributed $253 billion to the regional gross domestic product (GDP) (**FIGURE 2.6**).[2] These industries are anticipated to grow substantially, with manufacturing forecasted to increase its GDP contribution 130 percent by 2035 and wholesale trade growing 144 percent.

FIGURE 2.6 GDP Contribution of Goods Movement-Dependent Industries (2010)



LOGISTICS ACTIVITIES—INCLUDING WAREHOUSE AND DISTRIBUTION FACILITIES

The SCAG region hosts one of the largest clusters of logistics activity in North America. Logistics activities, and the jobs they provide, depend on a network of warehousing and distribution facilities, highway and rail connections, and intermodal railyards. In addition to carrying needed inventories, many warehouses and distribution centers in the SCAG region provide transloading services, or the deconsolidation and reloading of freight from marine containers to domestic containers. Because domestic containers are larger than marine containers, importers and shippers are able to realize significant cost savings in transportation costs through economies of scale by transloading. In addition, regional warehouse and distribution facilities may provide value added services. The abundance of warehousing and distribution facilities, along with the highly developed highway and rail network, serves as a competitive advantage for the SCAG region by attracting transloading activities that supply numerous local and regional jobs and revenue. Trucking access is particularly critical to warehousing and logistics businesses and the transloading industry.

[2] SCAG Comprehensive Regional Goods Movement Plan and Implementation Strategy, REMI.

Components of the Regional Goods Movement System

EXHIBIT 2.7 depicts the region's multimodal goods movement system. This system is comprised of the following major elements:

- **Seaports (Ports of Los Angeles, Long Beach, and Hueneme):** Serving as the largest container port complex in the U.S., the Ports of Los Angeles and Long Beach handled just under 120 million metric tons of cargo inports and exports, valued at $336 bilion in 2010.[3] Port Hueneme, in Ventura County, specializes in the import and export of automobiles, fresh fruit, and produce and serves as the primary support facility for the offshore oil industry.
- **Land Ports:** The international border crossings in Imperial County are busy commercial land ports responsible for over $7 billion in imports and $5 billion in exports in 2007 driven by the maquiladora trade and movement of agricultural products.
- **Air Cargo Facilities:** The SCAG region is home to numerous air cargo facilities, including Los Angeles International Airport (LAX) and Ontario International Airport (ONT), that together handled over 96 percent of the region's air cargo in 2010.
- **Interstate, Highways, and Local Roads:** The region has about 53,400 road miles, 1,630 miles of which are interstate and freeway type.[4] Sections of I-710, I-605, SR-60, and SR-91 carry the highest volumes of truck traffic in the region, averaging over 25,000 trucks per day in 2008. Other major components of the regional highway network also serve significant numbers of trucks, including I-5, I-10, I-15, and I-210, some with sections that carry over 20,000 trucks per day. These roads carry a mix of local, domestic trade, and international cargoes. The arterial roadway system also plays a critical role, providing "last mile" connections to regional ports, manufacturing facilities, intermodal terminals and warehouses, and distribution centers.
- **Class I Railroads:** Critical to the growth of the region's economy, the Burlington Northern Santa Fe Railway (BNSF) and Union Pacific (UP) carry international and domestic cargo to and from distant parts of the country. The BNSF main line operates on the Transcontinental Line (and San Bernardino Subdivision) while the UP operates on the Coast Line, Santa Clarita Line, Alhambra Line, LA Subdivision, and El Paso Line. Both railroads operate on the Alameda Corridor that connects directly to the San Pedro Bay Ports. The San Pedro Bay Ports also provide several on-dock rail terminals along with the six major intermodal terminals operated by the BNSF and UP.
- **Warehouse and Distribution Centers:** In 2008, the region had about 837 million square feet of warehousing space[5] and another 185 million square feet in developable land.[6] An estimated 15 percent of the occupied warehouse space served port-related uses, while the remaining 85 percent supported domestic shippers.[7] Many of these warehouses are clustered along key goods movement corridors (**EXHIBIT 2.7**). Port-related warehousing is concentrated in the Gateway Cities subregion, while national and regional distribution facilities tend to be located in the Inland Empire.

3 American Association of Port Authorities, U.S. Waterborne Foreign Trade, 2010 Ranking of US Customs Districts by Value of Cargo and by Volume of Cargo, November 23, 2011, http://www.aapa-ports.org/Industry/content.cfm?ItemNumber=900&navItemNumber=551 (last accessed February 2012)

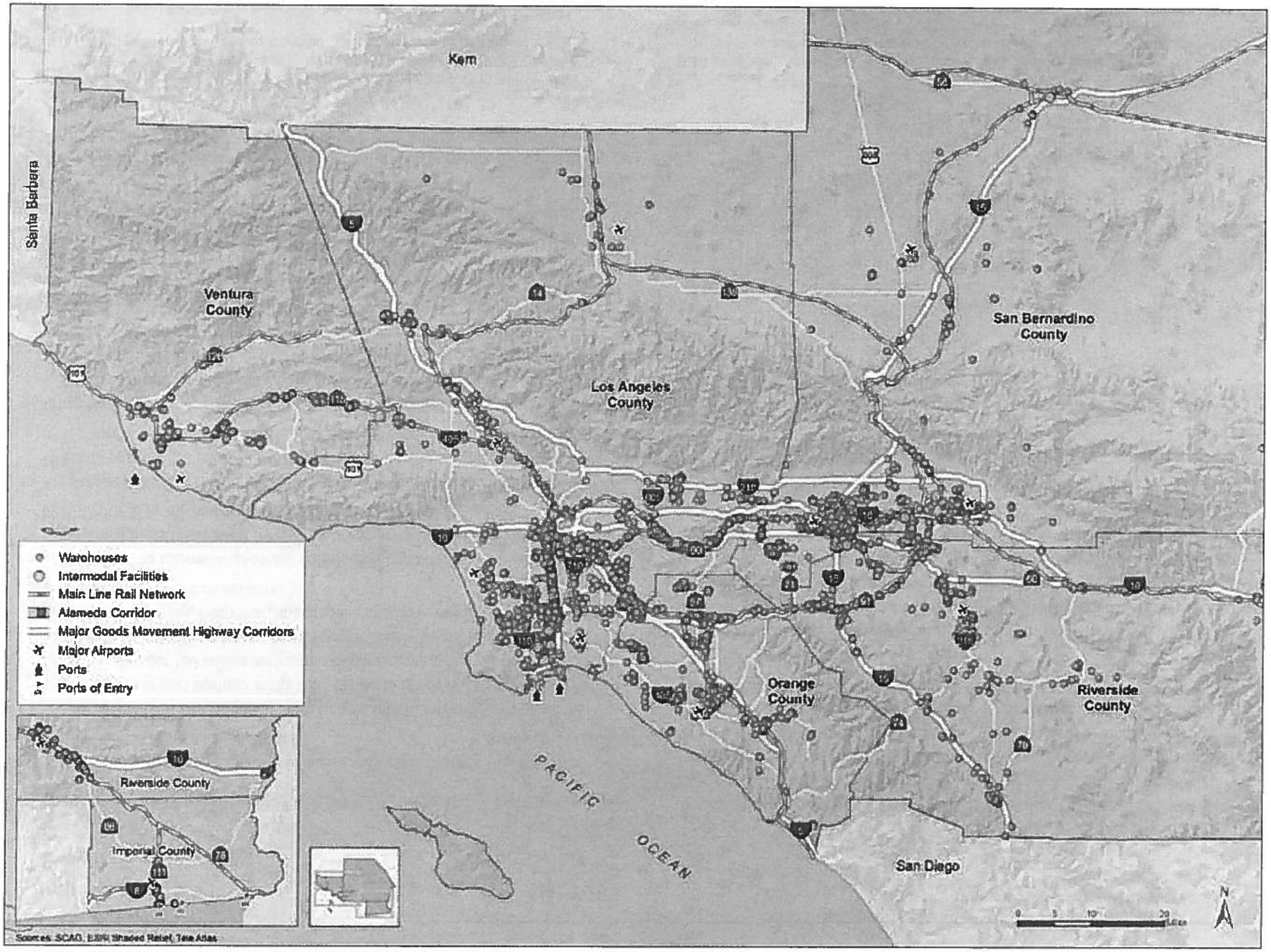
4 http://www.dot.ca.gov/hq/tsip/hpms/hpmslibrary/hpmspdf/2009PRD.pdf (last accessed on December 10, 2010.

5 SCAG Comprehensive Regional Goods Movement Plan and Implementation Strategy.

6 Potentially developable warehouse space is estimated based on land zoned and suitable for warehouse development.

7 Some domestic warehouse space may include use by domestic shippers mixing internationally sourced and domestically sourced goods.

EXHIBIT 2.7 Existing Regional Goods Movement System



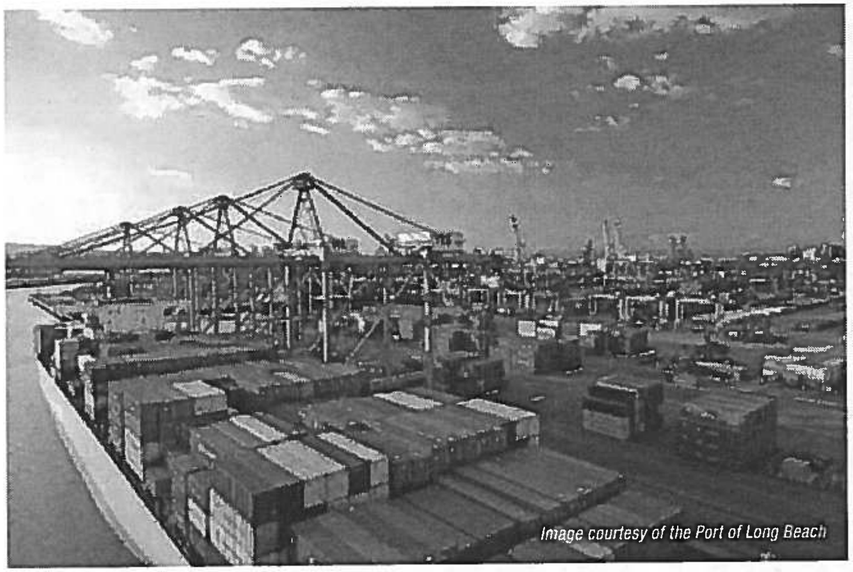


Image courtesy of the Port of Long Beach

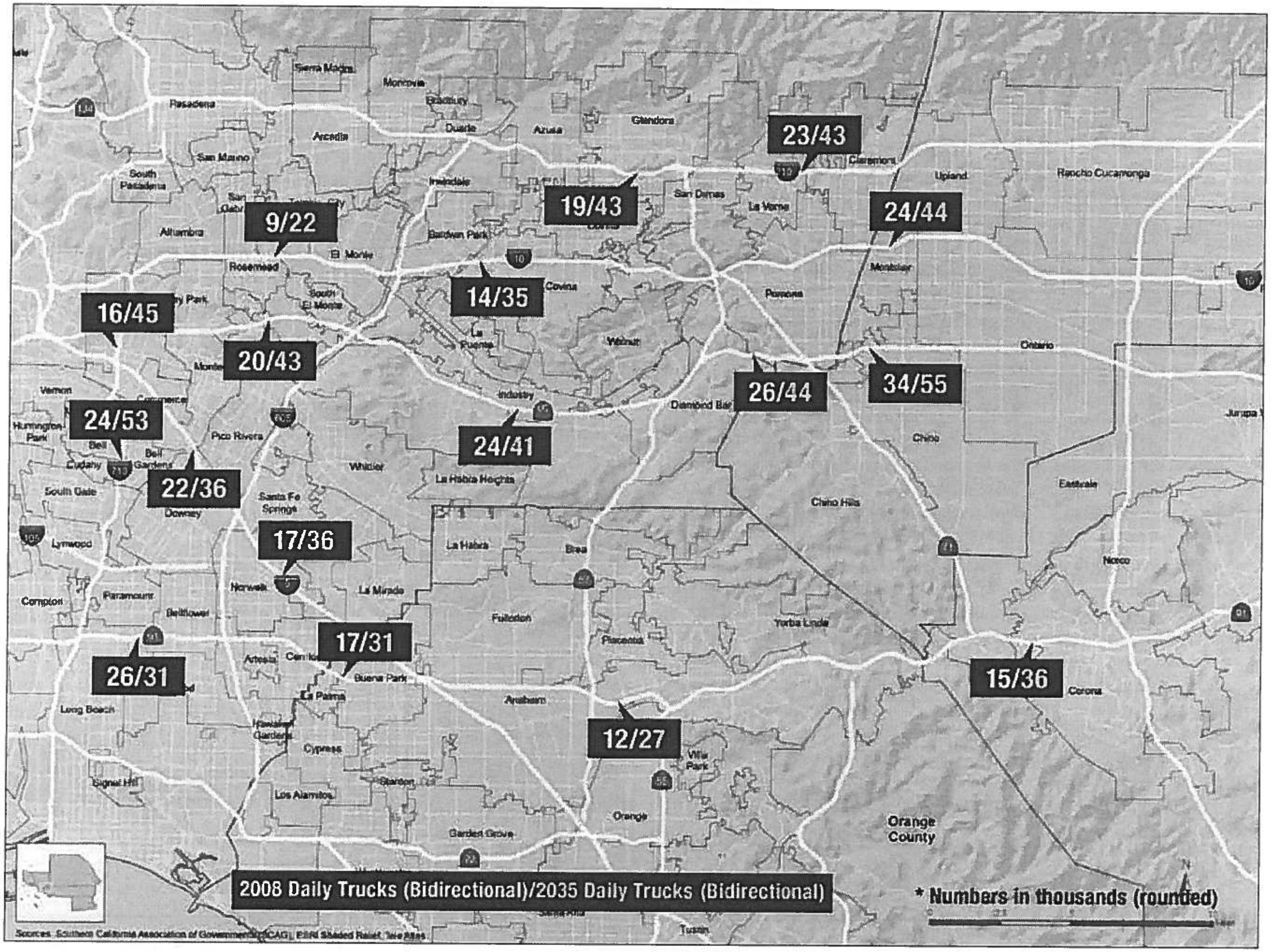
Goods Movement Trends and Drivers

There are a number of key trends that are anticipated to have major impacts on the goods movement system. These trends include:

- **Population and General Economic Growth:** Despite a current economic downturn brought on by challenging global conditions, population and employment in the SCAG region are expected to grow by approximately 24 percent and 22 percent by 2035, respectively. This growth will create increased consumer demand for products and the goods movement services that provide them. The increased demand will drive stronger growth in freight traffic on shared highway and rail facilities. Truck traffic on many key corridors is anticipated to grow substantially. Truck volumes on major corridors are shown in **EXHIBIT 2.B** for both 2008 and the 2035 baseline forecast. Without an increase in capacity, truck and auto delay will increase substantially, truck-involved accidents will be more frequent, and the levels of harmful emissions will rise. Moreover, growing demand for commuter rail services on rail lines owned by the freight railroads will create needs for expanded capacity on these facilities.
- **Recovery and Expansion of International Trade:** Within the RTP/SCS time horizon, international trade is anticipated to recover with renewed demand for both import and export capabilities. Despite increasing competition with other North American ports and the expansion of the Panama Canal, the San Pedro Bay Ports anticipate cargo volumes to grow to 43 million containers by 2035[8]—more than tripling from current levels. This will create the need to expand marine terminal facilities, improve highway connections (particularly those connecting directly to the San Pedro Bay Ports, like I-710 and SR-47), and address on-dock and off-dock intermodal terminal capacities. If port-related rail traffic and commuter demand are to be satisfied, additional main line capacity improvements will be required. Mitigating the impacts of increased train traffic on communities will continue to be a considerable challenge.
- **Continued Expansion of Warehouse and Logistics Activity:** Southern California is an ideal place for expanded distribution and logistics activity and will continue to be a significant source of good-paying jobs in the region through 2035. Demand for port-related warehouse space is projected to grow at a faster pace than demand for domestic warehousing. As space near the San Pedro Bay Ports reaches capacity, port warehousing will push out to the Inland Empire. Expansion in national and regional distribution facilities is also likely to occur in the Inland Empire, resulting in substantial congestion problems due to the increased truck volumes on regional highways. By 2035, the region may experience a shortfall of more than 228 million square feet in warehouse space relative to demand.
- **Air Quality Issues:** Much of the SCAG region does not meet federal ozone and fine particulate matter ($PM_{2.5}$) air quality standards. Goods movement emissions contributes to regional air pollution problems (NOx and $PM_{2.5}$). While emissions from goods movement are being reduced through efforts such as the San Pedro Bay Ports Clean Air Action Plan, these reductions are unlikely to be sufficient to meet regional air quality goals.

8 San Pedro Bay Ports Container Forecast.

EXHIBIT 2.8 Rising Truck Volumes on Key Truck Corridors (2008 and 2035 Baseline)



Sources: Southern California Association of Governments (SCAG), ESRI Shaded Relief, Tele Atlas

Goods Movement Strategy

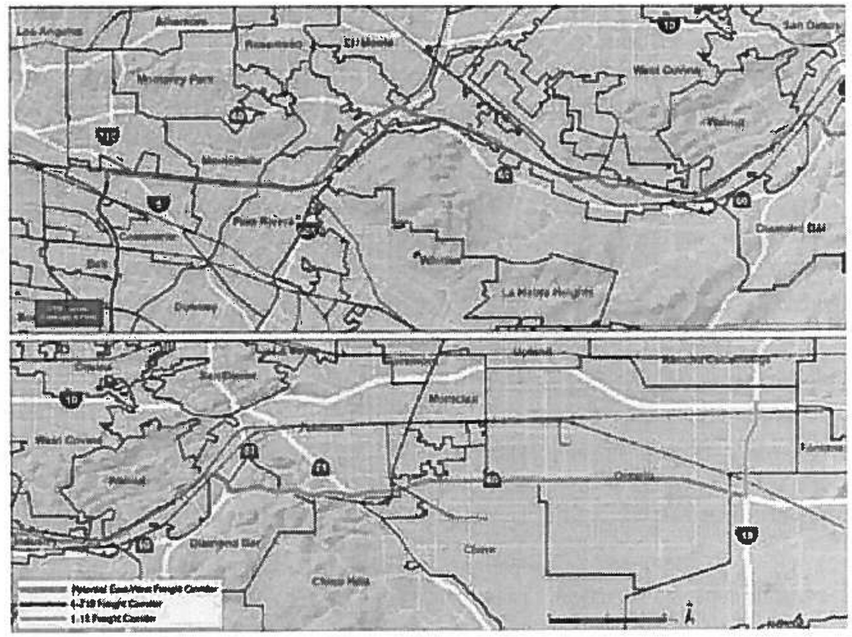
To ensure global competitiveness and realize the benefits of efficient and sustainable goods movement, it is critical to identify strategies and projects that address expected growth trends. Recent regional efforts have focused on strategies to develop a coherent, refined, and fully integrated regional goods movement system. Following the completion of the 2008 RTP, SCAG initiated the Comprehensive Regional Goods Movement Plan and Implementation Strategy. This effort, involving diverse regional stakeholders, is intended to identify a multimodal regional freight plan that integrates existing strategies and projects with newly developed regional initiatives advanced through the study. Some of these strategies are highlighted below.[9]

REGIONAL CLEAN FREIGHT CORRIDOR SYSTEM

In past RTPs, SCAG has envisioned a system of truck-only lanes extending from the San Pedro Bay Ports to downtown Los Angeles along I-710, connecting to an east-west segment, and finally reaching I-15 in San Bernardino County. Such a system would address the growing truck traffic on core highways through the region and serve key goods movement industries in a manner that mitigates negative impacts on communities and the environment. Truck-only freight corridors are effective, as they add capacity in congested corridors, improve truck operations and safety by separating trucks and autos, and provide a platform for the introduction and adoption of zero- and/or near zero emission technologies. Significant progress toward a regional freight corridor system has continued, as evidenced by recent work on an environmental impact report (expected to be completed in 2013) for the I-710 segment. As part of the 2012–2035 RTP/SCS, SCAG includes a refined concept for the east-west corridor component of the system and connections to an initial segment of I-15.

While numerous potential east-west freight corridor options were examined, the 2012–2035 RTP/SCS identifies a corridor concept to be explored further that could fall within a five-mile span of the route illustrated in **EXHIBIT 2.9**. More information on the corridor selection process is available in the Goods Movement Appendix.

EXHIBIT 2.9 Potential East-West Freight Corridor



Non-freeway alignments may provide an opportunity to move the facility away from neighborhoods and closer to the industrial uses that it would serve. Approximately 50 percent of the region's warehousing space and 25 percent of its manufacturing employment lie along the identified route. After adoption of the 2012–2035 RTP/SCS, additional study of alignments will be conducted, including an alternatives analysis completed as part of a full environmental review.

The East-West Freight Corridor would carry between 58,000 and 70,000 clean trucks per day that would be removed from adjacent general purpose lanes and local arterial roads. As highlighted in **TABLE 2.8**, the corridor would benefit a broad range of goods movement markets: Between 25–40 percent of the trucks would be port-related, almost 40 percent would serve local goods movement-dependent industries, and the remainder would support domestic trade. Truck delay would be reduced by up to 11 percent, while speeds for autos on SR-60 would be improved by 11–12 percent. Truck traffic on SR-60 general

9 For more detailed information on the SCAG Comprehensive Regional Goods Movement Plan and Implementation Strategy, please see the Goods Movement Appendix.

purpose lanes would be reduced by 42–82 percent, depending on location; by as much as 33 percent on I-10; and by as much as 20 percent on adjacent arterials. Separating trucks and autos would also reduce truck-involved accidents on east-west freeways that currently have some of the highest accident levels in the region (20–30 accidents a year on certain segments).[10]

For the 2012–2035 RTP/SCS, the regional freight corridor system also includes an initial segment of I-15 that would connect to the East-West Freight Corridor, reaching just north of I-10. Additional study will be undertaken to complete specification of the I-15 component of this project.

TABLE 2.8 Benefits of an East-West Corridor Strategy

Mobility	▪ Truck delay reduction of approximately 11% ▪ All traffic delay reduction of approximately 4.3% ▪ Reduces truck volumes on general purpose lanes—42–82% reduction on SR-60
Safety	▪ Reduced truck/automobile accidents (up to 20–30 per year on some segments)
Environment	▪ 100% zero-emission truck utilization removes 4.7 tons NOx, 0.16 tons $PM_{2.5}$, and 2,401 tons CO_2 daily (2.7–6% of region's total)
Community	▪ Preferred alignment has least impact on communities ▪ Removes traffic from other freeways ▪ Zero- and/or near- zero-emission technology (ZET)—reduces localized health impacts
Economic	▪ Supports mobility for goods movement industries, which comprise 34% of SCAG regional economy and jobs

[10] SCAG Comprehensive Regional Goods Movement Plan and Implementation Strategy.

BOTTLENECK RELIEF STRATEGY

In recent analysis of critical issues affecting the trucking industry conducted by the American Transportation Research Institute (ATRI), traffic congestion ranked near the top in 2011 after being less of a concern in 2009–2010 as a result of the economic downturn.[11] Besides causing delays to other highway users, heavy truck congestion results in wasted labor hours and fuel. In 2010, it was estimated that the cost of truck congestion in 439 major urban areas was approximately $23 billion.[12] Truck congestion in urban areas within the SCAG region resulted in approximately $2.6 billion in costs.[13] Given that driver wages and fuel costs represent over 50 percent of total motor carrier costs, truck congestion has major impacts on the bottom line of the trucking industry. Truck bottlenecks are also emission "hot spots" and generally have significantly degraded localized air quality caused by increased idling from passenger vehicles and trucks.

A coordinated strategy to address the top-priority truck bottlenecks is a cost-effective way to improve the efficiency of goods movement in the SCAG region. Bottleneck projects may also be easier to implement since they are often less intrusive than other types of projects; contribute to the region's environmental goals (by reducing emissions "hot spots"); and result in substantial, tangible benefits to commuters and goods movement industries alike.

SCAG recently studied key regional truck bottlenecks and associated projects. Through this analysis, project concepts that may address the highest-priority truck bottlenecks and have the most significant impact on delay were identified and continue to be evaluated. The 2012–2035 RTP/SCS allocates an estimated $5 billion toward goods movement bottleneck-relief strategies. Examples of bottleneck-relief strategies include ramp metering, extension of merging lanes, ramp and interchange improvements, capacity improvements, and auxiliary lane additions. Annually, over 1 million hours of heavy truck delay during the most congested time periods on area roadways could be eliminated if the highest-priority truck bottlenecks in the region are addressed. Additional information is provided in the Goods Movement Appendix.

[11] http://www.atri-online.org/2011_top_industry_issues.pdf.
[12] Texas Transportation Institute 2011 Urban Mobility Report.
[13] Texas Transportation Institute 2011 Urban Mobility Report. Urban areas as defined in the report include Los Angeles-Long Beach-Santa Ana, Riverside-San Bernardino, Lancaster-Palmdale, Bakersfield, Indio-Cathedral City-Palm Springs, and Oxnard-Ventura.

RAIL STRATEGY

The health of the Southern California economy depends on an efficient railroad system that has the capacity to accommodate projected growth in international and domestic freight. The railroad system in the SCAG region provides a critical connection between the largest port complex in the country and producers and consumers throughout the U.S. Over half of the international cargo arriving at the San Pedro Bay Ports utilizes rail (including on-, near-, and off-dock). Railroads also serve a myriad of domestic industries, predominantly for long-haul freight leaving the region. The extensive rail network in the SCAG region is a critical link in the regional supply chain, offering shippers the ability to move large volumes of goods over long distances at lower costs versus other transportation options.

The SCAG region is served by two Class I freight railroads: Burlington Northern Santa Fe Railway (BNSF) and Union Pacific Railroad (UP). BNSF operates a single main line extending from connections to the Alameda Corridor near downtown Los Angeles to Barstow with a terminus in Chicago. UP operates two main lines between downtown Los Angeles and the City of Colton. Both railroads share trackage rights on rail segments between West Riverside and Barstow through existing agreements. The Alameda Corridor, a 20-mile, multitrack freight rail expressway, connects the San Pedro Bay Ports with railyards and BNSF and UP rail lines in downtown Los Angeles.

The railroad network connects the SCAG region with many locations in the U.S. Major rail hubs in Illinois (Chicago in particular) and Texas constitute over 50 percent of total tonnage moving to and from the SCAG region. In order to deliver the benefits of rail transport to the region and the nation, the Southern California freight rail system needs to address future capacity needs on both the Class I main lines and at intermodal terminals where capacity is likely to be strained in light of future demand. The investments needed to meet these capacity needs will be made largely by the private railroads.

At the same time that the rail system is expanding to meet future demand, rail emissions need to be reduced further in order to contribute to the region's goal of meeting ambient air quality standards for the South Coast Air Basin. In addition, issues of grade crossing delay and safety in communities will need to be addressed. Lastly, growth in passenger rail services is an important component of regional mobility strategies and this will require expanded capacity. To the extent that passenger rail shares space on the freight rail system, the ability of the public sector to achieve regional goals within this capacity-constrained environment will be challenged. SCAG's recent analysis of train volumes for selected rail segments is shown in **TABLE 2.9.**[14]

TABLE 2.9 Peak Day Train Volumes 2010, 2035 (Metrolink Volumes in Parentheses)

Line Segments	Type	2010	2035
BNSF San Bernardino Subdivision Hobart-Fullerton	Passenger	54(28)	77(51)
	Freight	45	90
BNSF San Bernardino Subdivision Atwood-W. Riverside	Passenger	26(24)	42(40)
	Freight	49	99
BNSF San Bernardino Subdivision W. Riverside-Colton	Passenger	10(8)	42(40)
	Freight	67	147
BNSF Cajon Subdivision San Bernardino-Silverwood PLUS UP Mojave Subdivision W. Colton-Silverwood	Passenger	2(0)	2(0)
	Freight	93	147
UP Los Angeles Subdivision East LA-Pomona PLUS UP Alhambra Subdivision Yuma Jct.-Pomona	Passenger	13(12)	21(20)
	Freight	52	98
UP Los Angeles Subdivision Pomona-W. Riverside PLUS UP Alhambra Subdivision Pomona-West Colton	Passenger	13(12)	21(20)
	Freight	51	109
UP Yuma Subdivision Colton-Indio	Passenger	1(0)	1(0)
	Freight	45	93

14 These forecasts are based upon simulation analysis conducted for planning purposes only as part of the SCAG Comprehensive Regional Goods Movement Plan and Implementation Strategy. BNSF and UP do not forecast train volumes through 2035. Passenger volume totals include Amtrak and Metrolink.

As part of the Comprehensive Regional Goods Movement Plan and Implementation Strategy, SCAG worked closely with regional stakeholders to develop a set of rail strategies aimed at increasing freight and passenger mobility, promoting job creation and retention, improving safety, and mitigating environmental impacts.

Several different components comprise this rail package:

Main line rail improvements and capacity expansion: This includes rail-to-rail grade separations, double or triple tracking certain rail segments, implementing new signal systems, building universal crossovers, and constructing new sidings. These improvements would benefit both freight rail and passenger rail service, depending on their location.

Railyard improvements: This includes upgrades to existing railyards as well as construction of new yards. These projects would provide vital improvements to the region's ability to handle the projected growth in cargo volumes.

Grade separations of streets from rail lines: These projects reduce vehicular delay, improve emergency vehicle access, reduce the risk of accidents, and lower emissions levels.

Rail operation safety improvements: This includes technology such as Positive Train Control (PTC) that can greatly reduce the risk of rail collisions.

Key rail projects in the 2012–2035 RTP/SCS include:

- Rail-to-rail grade separation at Colton Crossing
- Additional main line tracks for the BNSF San Bernardino and Cajon Subdivisions and the UPRR Alhambra and Mojave Subdivisions
- Southern California International Gateway (SCIG)
- Modernization of the Intermodal Container Transfer Facility (ICTF)
- Highway-rail grade separations
- Port-area rail improvements, including on-dock rail enhancements

The benefits of the rail strategies to the region are considerable and include mobility, safety, and environmental gains. As shown in **TABLE 2.10**, these strategies could eliminate almost 6,000 hours of vehicle delay per day at grade crossings, decrease emissions (NOx, CO_2, and $PM_{2.5}$) by almost 23,000 lb. per day, and reduce overall train delay to 2000 levels.

TABLE 2.10 Benefits of the SCAG Regional Rail Strategy

Mobility	▪ Reduces train delay to 2000 levels ▪ Provides main line capacity to handle projected demand in 2035 (includes 43.2 million twenty-foot equivalent units, or TEUs, port throughput) ▪ Eliminates 5,782 vehicle hours of delay per day at grade crossings in 2035
Safety	▪ Eliminates 71 at-grade railroad crossings
Environment	▪ Reduces 22,789 lb. of emissions per day (CO_2, NOx, and $PM_{2.5}$ combined) from idling vehicles at grade crossings ▪ Facilitates on-dock rail ▪ Reduces truck trips to downtown railyards and associated emissions

GOODS MOVEMENT ENVIRONMENTAL STRATEGY

In Southern California, goods movement and air quality are inextricably linked. Much of the SCAG region (and nearly all of the urbanized area) does not meet federal ozone and fine particulate ($PM_{2.5}$) air quality standards. Goods movement is a major source of emissions that contributes to these regional air pollution problems as well as localized air pollution "hot spots" that can have adverse health impacts.

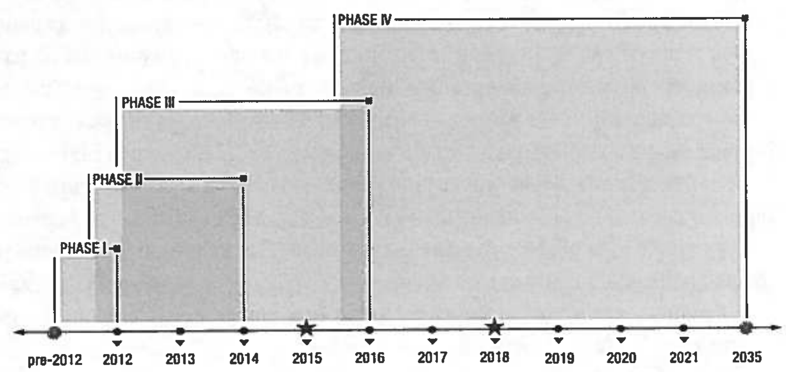
Goods movement is also a major source of greenhouse gas (GHG) emissions that contribute to global climate change. Although reduction in GHG emissions from goods movement is not required under California Senate Bill 375 (which focuses solely on light-duty vehicle emissions), the State has established GHG-reduction goals under California Assembly Bill 32. Clean goods movement activities can contribute to these goals. As such, the region's goods movement strategy is complementary to sustainable communities planning.

The two air pollutants of greatest concern in Southern California are nitrogen oxides (NOx) and fine particulate matter ($PM_{2.5}$). The South Coast Air Basin is classified as an extreme non-attainment area per the federal ambient ozone standard, with a required attainment date of 2023. By approximately 2031, a second, more stringent federal ozone standard must be attained. The federal Clean Air Act requires the region to demonstrate timely attainment of these standards or federal sanctions may result, such as interruption or curtailment of funding for transportation projects. To attain the federal ozone standards, the region will need broad deployment of zero- and near-zero-emission transportation technologies in the 2023 to 2035 timeframe. The 2012–2035 RTP/SCS includes a path forward to achieve this objective. Integration of advanced technologies into the region's goods movement strategies can contribute to other regional objectives, such as energy security, economic development opportunities, and potentially broader public support for infrastructure initiatives.

The 2012–2035 RTP/SCS focuses on a two-pronged approach for achieving an efficient freight system that reduces environmental impacts. For the near term, the regional strategy supports the deployment of commercially available low-emission trucks and locomotives while centering on continued investments into improved system efficiencies. For example, heavy-duty hybrid trucks and natural gas trucks are already in use, but market penetration can be increased. In the longer term, the strategy focuses on advancing technologies—taking critical steps now toward phased implementation of a zero- and near-zero-emission freight system. SCAG's planning efforts are cognizant of the need to incorporate evolving technologies into new infrastructure. These include technologies to fuel vehicles, as well as to charge batteries and provide power. As noted in the text box, the constrained RTP/SCS includes a near-term project for the demonstration and initial operational deployment of zero-emission trucks receiving wayside power.

Substantial investment will be required to develop and deploy the technologies needed for a zero- and near-zero emission goods movement system. A regional approach to meet this objective follows and is summarized in **FIGURE 2.7**. This path is discussed in greater detail in the Goods Movement Appendix.

FIGURE 2.7 Timeline to Implement a Zero- and Near-Zero-Emission Freight System



Major Milestones

- *2012 – Identify potential funding to support early demonstration efforts; incorporate into financially constrained RTP/SCS*
- *2012 – Implement plan of advocacy to secure action by federal or other governments*
- *2012–2013 – Continue to evaluate truck technology implementation and funding mechanisms; initiate testing of zero-emission container movement system along the Terminal Island Freeway and connecting routes to the Ports (or alternative routes serving the same locations)*
- *2012–2013 – Continue to evaluate practicability of applying electrified rail or other zero-/near-zero-emission technologies and evaluate funding and implementation mechanisms*
- *2015–2016 – Incorporate decisions on wayside power and technology direction, including strategy, funding, and timeframe into 2016 RTP update and SIP revisions; if existing rail technologies are practicable, identify technologies, infrastructure, and implementation mechanisms in RTP update and SIP*
- *2015–2016 – Begin deployment of appropriate zero- and/or near-zero-emission trucks and continue operational demonstration*
- *2018–2020 – If existing rail applications were not practicable, resolve need for new rail technologies and incorporate planning into the 2020 RTP*
- *2017–2035 – Full deployment of appropriate zero-and near-zero-emission trucks for substantially all regional transport; if existing electrified rail technologies can be practicably applied to the region, fully deploy such technologies*

Near-Term Zero-Emission Technology Demonstration and Initial Deployment

Description: This project is for near-term demonstration and, if successful, initial operational deployment of zero-emission trucks receiving wayside power.

Location: The project will be located in Los Angeles County along the Terminal Island Freeway and connecting routes to the Ports, (or alternative routes serving the same locations).

Schedule:

- By 2013 – Demonstration: Develop and build trucks and wayside power infrastructure sufficient for demonstration within the transport corridor consisting of the Terminal Island Freeway and connecting routes to the Ports (or alternative routes serving the same locations); commence demonstration upon completion of trucks and infrastructure.
- By 2015 – Initial Operational Deployment: Build wayside power infrastructure sufficient for operation on the Terminal Island Freeway and connecting routes to the Ports (or alternative routes serving the same locations), and build maximum number of trucks for initial operational deployment allowed by available funding (with all feasible leveraging of private resources), unless a zero-emission technology not utilizing wayside power is determined to be superior and can be implemented in a similar or earlier time frame. In the latter case, remaining funds allocated to this project will be applied to demonstration and deployment of zero-emission trucks not utilizing wayside power.

Cost: Project cost is $35 million, for both demonstration and initial operational deployment phases. This includes construction of infrastructure, design and build of demonstration trucks, and acquisition of a small fleet for initial operational deployment.

Funding: AQMD will actively partner in supporting this effort by providing available funding for vehicle technology or infrastructure (staff will make a proposal to the AQMD Board in 2012), seeking funding partners, and developing other support. Additionally, SCAG will work with local transportation agencies, the Ports, and other private and public stakeholders in 2012 to identify funding for this project. Other potential co-funding sources include:

- California Energy Commission AB 118 program
- California Air Resources Board
- California greenhouse gas cap and trade auction revenues
- Federal grants
- In-kind contributions and public private partnerships with technology developers, drayage companies, etc.
- Funds available for project mitigation

Project Rationale: The Ports, vehicle manufacturers, and other entities are currently demonstrating new zero-emission truck technologies, including battery-electric, fuel-cell, and hybrid-electric trucks with all electric range (AER). The purpose of this project is to demonstrate and initially deploy wayside power technology to provide power to these and other types of vehicles along certain high-volume corridors, thus allowing extended zero-emission range. Wayside technology has been used for many decades to power electric buses, mining trucks, and rail systems. It is thus a particularly proven and promising technological approach to achieving zero-emission transport. If coupled with hybrid AER technologies currently in use for passenger cars and now being demonstrated for heavy trucks, wayside power could provide flexibility, range, and compatibility with current port, railyard, and warehouse operations. Hybrid AER trucks could produce zero-emissions along key high-volume corridors (e.g. Terminal Island Freeway, I-710, east-west freight corridor), but could operate off the electrified corridor powered by conventional natural gas or diesel fuels, by fuel cells, or—within certain range—by batteries. Such vehicles thus could provide zero emissions where most needed, and would have range to travel long distances in other modes. The Terminal Island Freeway corridor, as a short, high-volume transport corridor with substantial air pollution impacts to local communities, is an important and ideal venue to initially deploy such technology. Deployment of wayside power technology is compatible with, and builds upon, the current Port efforts to develop and demonstrate electric and hybrid-electric trucks.

Phase I: Project Scoping – continue to build on current regional research and technology testing efforts.

Phase II: Evaluation, Development, and Prototype Demonstrations – convene working groups and increase understanding of operational needs. Evaluate, develop, and test prototype trucks and wayside power options. Continue to evaluate feasibility of zero- and/or near-zero-emission rail technologies. Work with public and private-sector partners to secure funding commitments for the development of new technology prototypes and demonstrations. Evaluation in this phase will address technology readiness, operational feasibility and funding availability.

Phase III: Initial Deployment and Operational Demonstration – truck fleet evaluation testing and deployment of zero-emission trucks along the Terminal Island Freeway and connecting routes to the Ports (or alternative routes serving the same locations). Additional deployment of zero- and/or near-zero emission trucks where feasible. Advanced technology locomotive prototype testing and demonstrations.

Phase IV: Full-Scale Demonstrations and Commercial Deployment – includes implementation of regulatory and market mechanisms needed to launch commercialization. The phase 4 timeframe accommodates the different technology readiness levels of various applications.

It is important that the region work collaboratively to pursue advanced technologies and secure funding for their development and deployment. Although several regional forums currently exist, SCAG anticipates building on these efforts by establishing a logistics working group with key stakeholders. Participants may include government agencies, logistics industry representatives, and original equipment manufacturers (OEMs). Future evaluation will ensure that any technology implemented meets regional emissions objectives while maintaining the efficiency, safety, and reliability of the goods movement system.

Modeling of environmental strategies has determined that significant emissions benefits could be achieved from implementation of different zero- and/or near-zero-emission technologies. As summarized in **TABLE 2.11**, zero-emission vehicles on the East-West Freight Corridor would eliminate 4.7 tons of NOx, 0.16 tons of $PM_{2.5}$, and 2,401 tons of CO_2 emissions daily and would set the stage for broader regional deployment of zero- and/or near-zero-emission technologies. Full electrification of the rail system, though still a concept at this point, would remove comparable amounts of NOx, $PM_{2.5}$, and CO_2. Regionally, a 20 percent market penetration of plug-in hybrid trucks would achieve a reduction of 8.3 tons of NOx, 0.16 tons of $PM_{2.5}$, and 3,200 tons of CO_2 daily.

TABLE 2.11 Environmental Benefits

Strategy	Impact		
	NOx	$PM_{2.5}$	CO_2
East-West Freight Corridor with 100% Zero-Emission Vehicles (ZEVs)	4.7	0.16	2,401
Full Railroad Main Line Electrification*	10.4	0.19	2,400
20% Penetration of Plug-in Hybrid Trucks	8.3	0.16	3,200

* Further evaluation is required to determine feasible options for implementation of rail electrification or other zero- and/or near-zero-emission rail systems.
Table source: SCAG Comprehensive Regional Goods Movement Plan and Implementation Strategy

2012–2035 RTP/SCS Environmental Mitigation

SAFETEA-LU, the reauthorization of TEA-21, was enacted into law on August 10, 2005. Pursuant to Section 6001 of this legislation, statewide or metropolitan long-range plans must include a discussion of "types of potential environmental mitigation activities and potential areas to carry out these activities, including activities that may have the greatest potential to restore and maintain the environmental functions affected by the plan." As such, the 2012–2035 RTP/SCS includes a discussion of mitigation in order to comply with this requirement. As a public agency in California, SCAG first and foremost fulfills mitigation requirements by complying with the California Environmental Quality Act (CEQA), and as such this discussion includes a summary of mitigation as laid out in the Program Environmental Impact Report (PEIR) accompanying the 2012–2035 RTP/SCS.

In addition, as part of the planning process, states and Metropolitan Planning Organizations (MPOs) "shall consult, as appropriate, with state and local agencies responsible for land use management, natural resources, environmental protection, conservation, and historic preservation concerning the development of a long-range transportation plan." They also must consider, if available, "conservation plans and maps" and "inventories of natural or historic resources."

California law requires SCAG to prepare and certify a PEIR prior to adopting the 2012–2035 RTP/SCS. The PEIR evaluates the environmental impacts of the 2012–2035 RTP/SCS when compared to existing conditions and proposes measures at the program level to mitigate impacts to the maximum extent feasible for those resources areas that would be affected by the Plan (and associated growth). These impact areas include, but are not limited to, land use, biological resources and open space, water and greenhouse gases. The 2012–2035 RTP/SCS also acts as a "self-mitigating" plan in certain impact areas, in that its policies and strategies lead to improved environmental outcomes for air quality, public health, congestion and other indicators, while accommodating population growth. The section below summarizes the mitigation program contained within the PEIR for this plan. The general purpose of the mitigation measures included in the PEIR is to identify how to protect the environment, improve air quality, promote energy efficiency and enhance public health in concert with the proposed transportation improvements and related planning.

It should be clearly noted that the 2012–2035 RTP/SCS itself leads to improved environmental outcomes for greenhouse gases, open space preservation, and improved public health among other key environmental indicators. Nevertheless, the implementation of plan projects and strategies may lead to environmental impacts. Transportation project implementation and development decisions are subject to their own environmental review processes. This mitigation discussion, along with more detailed information in the PEIR, is laid out as an informational resource as localized impacts are identified and mitigated.

Mitigation Strategies

The PEIR provides a list of mitigation measures which would be implemented by SCAG on a regional level, in order to assist in reducing environmental impacts related to implementation of the 2012–2035 RTP/SCS. SCAG is also responsible for developing a mitigation monitoring plan to track progress on implementation of these measures at the regional level. SCAG's mitigation is consistent with the general role played by a MPO including developing and sharing information, collaborating with partners, and developing regional policies. SCAG works with member agencies and stakeholders but does not implement projects or project-specific mitigation.

In addition, an Appendix to the PEIR (Appendix G) is included which extensively lists example measures that lead agencies may consider when identifying mitigation to reduce impacts on a project-specific basis. This list is meant to serve as a resource and base of information, which does not imply feasibility or applicability for any specific project. Some of the mitigation measures included in the appendix restate or describe, whole or in part, legal requirements and regulations affecting project implementation. These are included for informational purposes, and are not intended to supersede compliance with existing law or regulation. These mitigation measures help explain to the public the existing regulatory framework that could assist in mitigating potential environmental impacts.

Conservation Planning Policy

SAFETEA-LU requires that the RTP contain a discussion of types of potential environmental mitigation activities and potential areas to carry out these activities. This includes activities that may have the greatest potential to restore and maintain environmental functions affected by the plan [Sec. 6001(i)(2)(B)(i)]. As such, this is being addressed in the 2012–2035 RTP/SCS and is separate and distinct from the mitigation measures addressed in the PEIR. SCAG could demonstrate progress and satisfy SAFETEA-LU requirements through development of a program with the goal of large-scale acquisition and management of important habitat lands to mitigate impacts related to future transportation projects.

Suggested steps to develop a conservation policy of this type could include the following:

- Engage in a strategic planning process to determine the critical components and implementation steps for identifying and addressing open space resources;
- Identify and map regional priority conservation areas based on the most recent land use data for future consideration and potential inclusion in future plans;
- Engage with various partners, including CTCs, and build from existing local efforts to identify priority conservation areas and develop an implementable plan; and
- Develop regional mitigation policies or approaches for the 2016 RTP/SCS.

This strategy supports natural land restoration, conservation, protection and acquisition offering greenhouse gas (GHG) emissions reduction benefits. Post-2012–2035 RTP/SCS strategic planning efforts would include addressing various aspects of this proposed approach such as identifying appropriate agencies to partner with and determining specific mapping parameters (for example, geographic scale). In addition, this type of strategic planning approach could also be applied to address impacts to other resource areas.

Summary of the Environmental Mitigation Program

As required by SAFETEA-LU, the 2012–2035 RTP/SCS includes an environmental mitigation program that links transportation planning to the environment. Building on its strong commitment to the environment as demonstrated in the 2008 RTP, SCAG's mitigation program is intended to function as a resource for lead agencies to consider in identifying mitigation measures to reduce impacts anticipated to result from future projects as deemed applicable and feasible by such agencies. This mitigation discussion also utilizes documents created by federal, state and local agencies to guide environmental planning for transportation projects. The following discussion focuses on specific resource areas and example approaches to mitigate impacts in these areas.

BIOLOGICAL RESOURCES AND OPEN SPACE

The PEIR includes two regional scale maps that identify sensitive environmental resources, such as protected lands and sensitive habitats. According to the Federal Highway Administration, there are more than 3.9 million centerline miles of public roads that span the United States. Each year, millions of vertebrates – birds, reptiles, and amphibians, are killed on roads, making road kill the greatest human cause of wildlife mortality in the country.[15] As in previous RTPs, the 2012–2035 RTP/SCS seeks to minimize transportation-related impacts on wildlife, and also better integrate transportation infrastructure into the environment.

Impacts to biological resources generally include displacement of native vegetation and habitat on previously undisturbed land; habitat fragmentation and decrease in habitat connectivity; and displacement and reduction of local, native wildlife including sensitive species. Building new transportation routes and facilities through undisturbed land or expanding facilities and increasing the number of vehicles traveling on existing routes will directly injure wildlife species, cause wildlife fatalities, and disturb natural behaviors such as breeding and nesting. Without appropriate mitigation, this will result in the direct reduction or elimination of species populations (including sensitive and special-status species) and native vegetation (including special-status species and natural communities) as well as the disruption and impairment of ecosystem services provided by native habitat areas.

[15] U.S. Department of Transportation, Federal Highway Administration, Wildlife and Highways: An Overview.

The biological resources mitigation program includes the following types of example measures:

- Planning transportation routes to avoid/minimize removal of native vegetation, displacement of wildlife, and impacts to regionally and locally significant habitat types such as oak woodlands, vernal pools, estuaries, lagoons, and other riparian areas;
- Including provisions for habitat enhancement such as mitigation banking, improving/retaining habitat linkages, preserving wildlife corridors and wildlife crossings to minimize the impact of transportation projects on wildlife species and habitat fragmentation;
- Conducting appropriate surveys to ensure no sensitive species' habitator special status natural communities is unnecessarily destroyed;
- Avoiding and minimizing impacts to wildlife activities (such as breeding, nesting, and other behaviors) during construction of the project by avoiding construction during critical life stages or sensitive seasons;
- Avoiding and minimizing impacts to habitat during project construction through actions such as fencing off sensitive habitat, minimizing vehicular accessibility, and salvaging native vegetation and topsoil; and
- Minimizing further impacts to wildlife and their habitats after project construction by replanting disturbed areas; providing vegetation buffers at transportation facilities with heavy traffic; and restoring local, native vegetation.

LOCATIONS FOR MITIGATION

As part of the development of the 2012–2035 RTP/SCS, SCAG prepared maps of natural resources areas, protected open space, and farmland (see Chapter 4, Exhibits 4.6, 4.7, and 4.8). These maps also show the location of county-level conservation efforts such as Habitat Conservation Plans (HCPs) and Natural Communities Conservation Plans (NCCPs). For example, Riverside County's Multiple Species Habitat Conservation Plan efforts in WRCOG and CVAG were included in the inventory of county-level conservation plans. In addition, as part of the 2008 Regional Comprehensive Plan, SCAG mapped locations of the protected and unprotected areas in relation to wildlife linkages, linkage design areas, park and recreation areas (from SCAG's 2008 land use inventory), agricultural lands, and developed lands. Together, these maps form the region's open space infrastructure. These maps will be updated as a function of post-RTP/SCS planning efforts, including identification of appropriate areas based on input from stakeholders.

Specifically, those areas that are "unprotected" could be possible locations for future mitigation. SCAG does not have the authority to purchase or manage lands. Conservation of these areas will build upon already-established programs, including but not limited to OCTA's Measure M Mitigation Program, which ensures open space conservation in a voluntary manner working with willing land owners. SCAG will continue to work with its regional partners to help facilitate conservation.

Types of Mitigation Activities

The mitigation program of the 2012–2035 RTP/SCS generally includes strategies to reduce impacts where transportation and sensitive lands intersect and also encourages smart land use strategies that maximize the existing system and eliminate the need for new facilities that might impact open space and habitat. Potential mitigation programs include planning of transportation projects to avoid or lessen impacts to open space, recreation land, and agricultural lands through information and data sharing, increasing density in developed areas and minimizing development in previously undeveloped areas that may contain important open space.

The mitigation program also emphasizes the importance of integrating consideration of wildlife and habitat into the design of transportation facilities in those areas where impacts cannot be avoided. SCAG encourages project sponsors to review Ventura County's Wildlife Crossing Guidelines and FHWA's Critter Crossings. Both documents provide examples of context-sensitive solutions (CSS) which is a way of involving all stakeholders to develop transportation facilities that fit their physical setting and preserve scenic, aesthetic, historic and environmental resources, while maintaining safety and mobility. CSS is an approach that considers the total context within which a transportation improvement project will exist. CSS principles include the employment of early, continuous, and meaningful involvement of the public and all stakeholders throughout the project development process. Additional information on CSS is available on FHWA's website at: http://www.fhwa.dot.gov/context/index.cfm.

In summary, the biological resources and open space mitigation program includes, but is not limited to, the following types of example measures:

- Identifying open space areas that can be preserved and developing mitigation measures such as mitigation banking, transfer of development rights (for agricultural lands), and payment of in lieu fees;
- Updating General Plan information from cities to provide the most recent land use data to the region;
- Coordinating with cities and counties on growth strategies that maximize the existing transportation network;
- Evaluating project alternatives and alternative route alignments where projects intersect with sensitive habitats; and
- Integrating the planning of transportation facilities with context-sensitive design elements such as wildlife crossings.

GREENHOUSE GASES

California is the fifteenth largest emitter of GHGs on the planet. The transportation sector, primarily, cars and trucks that move goods and people, is the largest contributor with 36.5 percent of the State's total GHG emissions in 2008. On road emissions (from passenger vehicles and heavy duty trucks) constitute 93 percent of the transportation sector total. Emissions from passenger vehicles, which are subject to SB 375 and this 2012–2035 RTP/SCS, constitute 78 percent of the state's GHG emissions from the transportation sector. In order to disclose potential environmental effects of the 2012–2035 RTP/SCS, SCAG has prepared an estimated inventory of the region's existing GHG emissions, identified mitigation measures, and compared alternatives in the PEIR. Although the 2012–2035 RTP/SCS demonstrates a reduction in per capita greenhouse gas emissions and meets SB 375 targets, mitigation is identified here in summary form, and in the PEIR, to provide information on how GHG can be reduced from other sectors as well as through subsequent planning and implementation.

The GHG mitigation program includes, but is not limited to, the following types of example measures:

- Land use changes included in the SCS that reduce the number and length of trips;
- Encouragement of green construction techniques such as using the minimum amounts of GHG emitting construction equipment;
- Public outreach campaigns publicizing the importance of reducing GHG emissions; and
- Promotion of pedestrian and bicycle as modes of transportation.

AIR QUALITY

The 2012–2035 RTP/SCS includes programs, policies and measures to address air emissions. Measures that help mitigate air emissions are comprised of strategies that reduce congestion, increase access to public transportation, improve air quality, and enhance coordination between land use and transportation decisions. SCAG's vision includes the introduction of a high-speed, high-performance regional transport system that may potentially reduce airport and freeway congestion and provide an alternative to the single-occupancy automobile. In order to disclose potential environmental effects of the 2012–2035 RTP/SCS, SCAG has prepared an estimated inventory of the region's emissions, identified mitigation measures, and compared alternatives in the PEIR. The mitigation measures seek to achieve the maximum feasible and cost-effective reductions in emissions. As noted above under "Greenhouse Gases," the Plan shows across-the-board improvements air emissions. Nevertheless, mitigation is identified for information and to aid in subsequent planning and project delivery.

The air quality mitigation program includes, but is not limited to, the following example measures:

- ARB measures that set new on-road and off-road engine standards and accelerate turnover of higher emitting engines from the in-use fleet;
- Project specific measures to reduce impacts from construction activities such as the use of water and dust suppressants and restrictions on trucks hauling dirt, sand and soil; and
- Incorporating planting of shade trees into construction projects where feasible.

In addition, the 2012–2035 RTP/SCS includes Transportation Control Measures (TCMs), which are those projects that reduce congestion and improve air quality in the region. For a comprehensive discussion and details of TCMs, please see the Transportation Conformity Analysis appendix.

TRANSPORTATION AND SAFETY

The 2012–2035 RTP/SCS takes into account the population, households, and employment projected for 2035, and therefore the largest demand on the transportation system expected during the lifetime of the plan. In accounting for the effects of regional population growth, the model output provides a regional, long-term and cumulative level of analysis for the impacts of the 2012–2035 RTP/SCS on transportation resources. The regional growth, and thus, cumulative impacts, is captured in the vehicle miles traveled (VMT), vehicle hours traveled (VHT), and heavy-duty truck VHT data.

Implementation of the 2012–2035 RTP/SCS includes a series of projects which are described in the 2012–2035 RTP/SCS. Consistent with SB 375 Regional Target Advisory Committee's final report to the California Air Resources Board, the 2012–2035 RTP/SCS includes projects and strategies "to smooth extreme congestion to more carbon friendly speeds." A subset of projects included in the 2012–2035 RTP/SCS reduces GHG emissions by providing relief of existing and projected congestion. Those include toll roads, express lanes, high occupancy vehicle lanes, and dedicated truck toll lanes. Congestion pricing is a transportation demand management tool incorporated into the 2012–2035 RTP/SCS for reducing GHG emissions. More information on SCAG's congestion management efforts can be found in Chapter 2, Transportation Investments. Orange County's Toll Road Network is a prime example of priced congestion relief projects.

The 2035 transportation system performance is compared to the performance of the existing (2011) system for the purpose of determining the significance of impacts. The SCAG region is vulnerable to numerous threats that include both natural and human-caused incidents. As such, a mitigation program related to safety is included in the PEIR. The mitigation program for the 2012–2035 RTP/SCS aims for extensive coordination, collaboration and flexibility among all of the agencies and organizations involved in planning, mitigation, response and recovery.

The transportation and safety mitigation program includes, but is not limited to, the following types of example measures:

- Increasing rideshare and work-at-home opportunities to reduce demand on the transportation system;
- Investments in active transportation and maximizing the benefits of the land use transportation connection;
- Transportation Demand Management (TDM) measures;
- Goods movement capacity enhancements;
- Key transportation investments targeted to reduce heavy-duty truck delay;
- Establishing transportation infrastructure practices that promote and enhance security;
- Helping to enhance the region's ability to deter and respond to terrorist incidents, and human-caused or natural disasters by strengthening relationships and coordination with transportation agencies; and
- Working to enhance emergency preparedness awareness among public agencies and with the public at large.

POPULATION AND HOUSING

Transportation projects including new and expanded infrastructure are necessary to improve travel time and can enhance quality of life for those traveling throughout the region. The package of transportation improvements in the 2012–2035 RTP/SCS is designed to accommodate total growth while allowing for mobility. The Plan would not affect the total growth in population in the region. The 2012–2035 RTP/SCS can affect the distribution of that growth. Land use and housing impacts associated with transportation projects, such as dividing established communities through right-of-way acquisition, can occur at a localized scale.

The population and housing mitigation program includes, but is not limited to, the following types of example measures:

- Encourage project implementation agencies to provide relocation assistance, as required by law, for residences and businesses displaced; and
- Encourage project implementation agencies to design new transportation facilities that consider existing communities.

LAND USE

The 2012–2035 RTP/SCS contains transportation projects to help more efficiently distribute population, housing, and employment growth, as well as a forecasted pattern of development described in detail in the SCS (Chapter 4). These transportation projects are generally consistent with the county- and regional-level general plan data available to SCAG; however, general plans are not updated consistently. The Plan includes a projected pattern of development that, in order to maximize the effectiveness of the transportation system, differs from local General Plan land uses beyond 2020.

The land use mitigation program includes, but is not limited to, the following types of example measures:

- Encourage cities and counties to update their general plans and provide the most recent plans to SCAG;
- Work with member cities to encourage that transportation projects are consistent with the 2012–2035 RTP/SCS and general plans; and
- Work with cities and counties to encourage general plans reflect 2012–2035 RTP/SCS policies.

AESTHETICS

The SCAG region includes several highway segments that are recognized by the State as designated scenic highways or are eligible for such designation. Construction and implementation of projects in the 2012–2035 RTP/SCS could impact designated scenic highways and restrict or obstruct views of scenic resources such as mountains, ocean, rock outcroppings, etc. In addition, some transportation projects could add urban visual elements, such as transportation infrastructure (highways, transit stations) to previously natural areas.

In summary, the aesthetics mitigation program includes, but is not limited to, the following types of example measures:

- Encourage project implementation agencies to implement design guidelines to protect views of scenic corridors; encourage project implementation agencies to use construction screens and barriers that complement the existing landscape;
- Encourage project implementation agencies to complete design studies for projects in designated or eligible scenic highways; and
- In visually sensitive areas, encourage local land use agencies to apply development standards and guidelines that maintain compatibility.

PUBLIC SERVICES AND UTILITIES

As noted above under "Population and Housing," the 2012–2035 RTP/SCS will not affect the total amount of growth in the region, nor will it increase growth for any jurisdiction beyond local input. As such, any impacts to public services and utilities are identified only in relation to existing conditions or at a localized scale. These impacts generally include additional demands on fire and police services, schools and landfills. Additional police and fire personnel would be needed to adequately respond to emergencies and routine calls, particularly on new or expanded transportation facilities. Other potential impacts at a localized scale could entail demands on public schools, solid waste facilities and disposal facilities.

In summary, the public services and utilities mitigation program includes, but is not limited to, the following types of example measures:

- Encourage the project implementation agencies to identify police protection, fire service, emergency medical service, waste collection and public school needs and coordinate with local officials to ensure that the existing public services would be able to handle the increase in demand for their services;
- Encourage the project implementation agencies to identify the locations of existing utility lines and avoid all known utility lines during construction;
- Encourage green building measures to reduce waste generation and reduce the amount of waste sent to landfills; and
- Encourage the use of fire-resistant materials and vegetation when constructing projects in areas with high fire threat.

As the region continues to add more people, households and jobs, the demand for energy will continue to grow. Every day, the SCAG region consumes more than 23 million gallons of oil and the SCAG region's vehicle fuel consumption has increased 20 percent over the last ten years. In the face of this growth in energy demand and concerns about future oil supplies, there is the mounting realization that we are living in an energy-constrained world. As such, the 2012–2035 RTP/SCS includes strategies to reduce VMT, and as a result, per capita energy consumption from the transportation sector. The PEIR also includes measures relating to energy designed to reduce consumption and increase the use and availability of renewable sources of energy in the region. Since these measures not only reduce energy consumption but also reduce GHG emissions they are addressed above under the GHG section.

SCAG acknowledges the substantial efforts occurring locally to reduce energy consumption including, but not limited to, the Palmdale Energy Action Plan, the City of San Bernardino Energy Efficiency Conservation Strategy, and energy efficiency partnerships in the San Gabriel Valley, South Bay Cities Council of Governments, Coachella Valley Association of Governments, Ventura County, and Los Angeles County. These efforts demonstrate a commitment to achieving energy efficiency and sustaining economic, environmental, and physical health at the local and regional levels. They also provide a good starting point for any subsequent planning and analysis at the regional level.

GEOLOGY, SOILS, AND SEISMICITY

Impacts to geological resources generally include the disturbance of unstable geologic units (rock type) or soils, causing the loss of topsoil and soil erosion, slope failure, subsidence, project-specific seismic activity and structural damage from expansive soils. These activities, in addition to building projects on and around Alquist-Priolo Fault Zones and other local faults, could expose people and/or structures to the risk of loss, injury, or death.

The geological mitigation program includes, but is not limited to, the following types of example measures:

- Employing appropriate grading, construction practices, siting, and design standards, such as adherence to the California Building Code and State of California design standards;
- Obtaining site-specific geotechnical data from qualified geotechnical experts; and
- Encouraging compliance with all relevant local, state, and federal construction and design requirements for structures located on or across Alquist-Priolo Fault Zones and other local faults.

CULTURAL RESOURCES

Impacts to cultural resources generally include substantial adverse changes to historical and archaeological resources and direct or indirect changes to unique paleontological resources or sites or unique geological features. Similar to the discussion under "Land Use and Housing," these impacts can occur at the localized scale and in relation to existing conditions, as the Plan itself does not affect the total amount of growth in the region. Adverse changes include the destruction of culturally and historically (recent or geologic time) significant and unique historical, archaeological, paleontological, and geological features.

The cultural resources mitigation program includes, but is not limited to, the following types of example measures:

- Obtaining consultations from qualified cultural and paleontological resource experts to identify the need for surveys and preservation of important historical, archaeological, and paleontological resources;
- Implementing design and siting measures that avoid disturbance of cultural and paleontological resource areas, such as creating visual buffers/landscaping or capping/filling the site to preserve the contextual setting of the resource;
- Monitoring construction activity in areas with moderate to high potential to support paleontological resources and overseeing salvage operations of paleontological resources; and
- Consulting local tribes and the Native American Heritage Commission for project impacts to sacred lands and burial sites.

WATER RESOURCES

Impacts to water resources from the 2012–2025 RTP/SCS include potential water quality impairment from increased impervious surfaces. Increased impervious surfaces in water recharge areas potentially impact groundwater recharge and groundwater quality. Cumulative impacts include increased impervious surfaces; increased development in alluvial fan floodplains; and increased water demand and associated impacts, such as drawdown of groundwater aquifers. Similar to the discussion under "Land Use and Housing," these impacts can occur at the localized scale and in relation to existing conditions, as the Plan itself does not affect the total amount of growth in the region. Increased output of greenhouse gases from the region's transportation system impacts the security and reliability of the imported water supply.

The water resources mitigation program includes, but is not limited to, the following types of example measures:

- Utilizing advanced water capture and filtration techniques, showing a preference for naturalized systems and designs, to control stormwater at the source;
- Avoiding any new construction of impervious surfaces in non-urbanized areas, such as wetlands, habitat areas, parks, and near river systems;
- Avoiding any new construction that provides access to flood-prone areas, such as in alluvial fans and slide zones;
- Protection and preservation of existing natural flood control systems, such as wetlands and riparian buffers, and expansion of such systems in areas where they do not currently exist;
- Constructing projects according to Best Management Practices for water quality protection and water conservation, including low-impact development and green building standards; and
- Coordinating project development and construction efforts across jurisdictional, agency, and departmental boundaries, to increase project benefits.

HAZARDOUS MATERIALS

Implementation of the 2012–2035 RTP/SCS would affect the transportation and handling of hazardous materials in the SCAG region. Expected significant impacts include risk of accidental releases due to an increase in the transportation of hazardous materials and the potential for such releases to reach neighborhoods and communities adjacent to transportation facilities. The hazardous materials mitigation program aims to minimize the significant hazard to the public or the environment that involves the release of hazardous materials into the environment. Potential mitigation programs include active coordination with regulatory agencies and first responders in order to ensure proper handling and transport of hazardous materials and their containers.

Mitigation measures also involve ensuring that the project implementation agency complies, when applicable and feasible, with all laws, regulations, and health and safety standards set forth by federal, state, and local authorities that regulate the proper handling of such materials and their containers and that the routine transport, use, and disposal of hazardous materials does not create a significant hazard to the public or the environment.

The hazardous materials mitigation program includes, but is not limited to, the following types of example measures:

- Coordinating with regulatory agencies and first responders in order to continue to govern goods movement and hazardous materials transportation throughout the region;
- Considering existing and known planned school locations when determining the alignment of new transportation projects and modifications to existing transportation facilities;
- Encouraging project sponsors to consider published lists of contaminated properties, which are continually updated, in order to identify cases where new development would involve the disturbance of contaminated properties;
- Developing applicable mitigation measures to assure that worker and public exposure is minimized to an acceptable level and to prevent any further environmental contamination as a result of construction; and
- Encouraging that project implementation agencies comply with all applicable laws, regulations, and health and safety standards set forth by federal, state, and local authorities that regulate the proper handling of such materials and their containers and that the routine transport, use, and disposal of hazardous materials does not create a significant hazard to the public or the environment.

NOISE

Some of the principal noise generators within the SCAG region are associated with transportation (i.e., airports, freeways, arterial roadways, seaports, and railroads). Additional noise generators include stationary sources, such as industrial manufacturing plants and construction sites. Noise impacts resulting from the 2012–2035 RTP/SCS generally include exposure of sensitive receptors to noise in excess of normally acceptable noise levels or substantial increases in noise as a result of the operation of expanded or new transportation facilities. As such, the noise mitigation program includes measures designed to minimize the impact of noise on sensitive receptors. These measures include encouraging that project implementing agencies, when applicable and feasible, comply with all local sound control and noise level rules, regulations, and ordinances; utilizing the best available noise control techniques (including mufflers, intake silencers, ducts, engine enclosures and acoustically attenuating shields or shrouds) in order to minimize construction noise impacts; and utilizing land use planning measures, such as zoning, restrictions on developments, buffers, etc., to minimize exposure to sensitive receptors.

The noise mitigation program includes, but is not limited to, the following types of example measures:

- Encouraging project implementing agencies to comply with all local sound control and noise level rules, regulations, and ordinances;
- Developing the best available noise control techniques in order to minimize construction noise impacts;
- Conducting a project-specific noise evaluation as part of the appropriate environmental review of each project; and
- Encouraging project implementation agencies to maximize the distance between noise-sensitive land uses and new roadway lanes, roadways, rail, transit centers, park-and-ride lots, and other new noise-generating facilities.